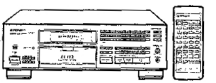
PIONEER
The Art of Entertainment

Service Manual



ORDER NO.
ARP2228

COMPACT DISC PLAYER

PD-31
PD-8700 PD-8700-S
PD-7700 PD-7700-S

PD-31, PD-8700, PD-8700-S, PD-7700 AND PD-7700-S HAVE THE FOLLOWING :

Type	Model					Power Requirement	Remarks
	PD-31	PD-8700	PD-8700-S	PD-7700	PD-7700-S		
KU	○	–	–	○	–	AC120V only	
KC	–	–	–	○	–	AC120V only	
HEM	–	○	–	○	–	AC220-230V, AC230-240V(switchable)*	
HB	–	○	–	○	–	AC220-230V, AC230-240V(switchable)*	
SD	–	○	–	○	–	AC110V, 120-127V, 220V, 240V(switchable)	
HEWM	–	–	○	–	○	AC220-230V, AC230-240V(switchable)*	
HPW	–	–	–	○	–	AC220-230V, AC230-240V(switchable)*	

*: Change the primary wiring of the power transformer.

- **This manual is applicable to the PD-31/KU, PD-8700/HEM, HB, SD, PD-8700-S/HEWM, PD-7700/KU, KC, HEM, HB, SD, HPW and PD-7700-S/HEWM types.**
- **As to the PD-8700/HEM, HB, SD AND PD-8700-S/HEWM types, refer to page 81.**
- **As to the PD-7700/KU, KC, HEM, HB, SD, HPW and PD-7700-S/HEWM types, refer to page 83.**
- **Ce manuel pour le service comprend les explications de réglage en français.**
- **Este manual de servicio trata del método ajuste escrito en español.**

CONTENTS

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FI APR. 1991 Printed in Japan

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

1. SAFETY INFORMATION

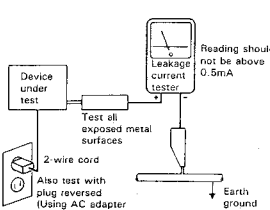
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

(FOR EUROPEAN MODEL ONLY)

VARO!
AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

ADVERSEL:
USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSAETTELSE FOR STRÅLING.

VARNING!
OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.

LASER
Kuva 1
Lasersateilyn
varoitusmerkki

WARNING!
DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.

IMPORTANT
THIS PIONEER APPARATUS CONTAINS LASER OF HIGHER CLASS THAN 1. SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

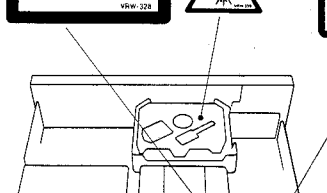
LASER DIODE CHARACTERISTICS
MAXIMUM OUTPUT POWER: 5 mw
WAVELENGTH: 780-785 nm

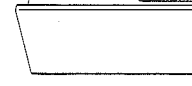
LASER
Picture 1
Warning sign for
laser radiation

LABEL CHECK

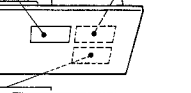
HB,HEM and HEWM types

HEM and HEWM types





HEM and HEWM types



HB type

Additional Laser Caution

1. Laser Interlock Mechanism
   The ON/OFF (ON : low level, OFF : high level) status of the LPS1 (S601) and LPS2 (S602) switches for detecting the loading state is detected by the system microprocessor, and the design prevents laser diode oscillation when both switches LPS1 and LPS2 are not ON (low level)(clamped state).
   Thus, interlock will no longer function if switches LPS1 (S601) and LPS2(S602) are deliberately shorted.
   Also, in the test mode*, the interlock mechanism does not operate too.
   Laser diode oscillation will continue if pins 2 and 3 of CXA1471S (IC101) are connected to ground or pin 20 is connected to high level (ON) or the terminals of Q101 are shorted to each other (fault condition).
2. When the cover is opened with the servo mechanism block removed to be turned over, close viewing of the objective lens with the naked eye will cause exposure to a Class 1 or higher laser beam.

* Refer to page 36.

2. EXPLODED VIEWS AND PARTS LIST

NOTES :

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

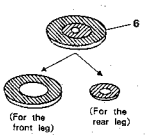
2.1 EXTERIOR

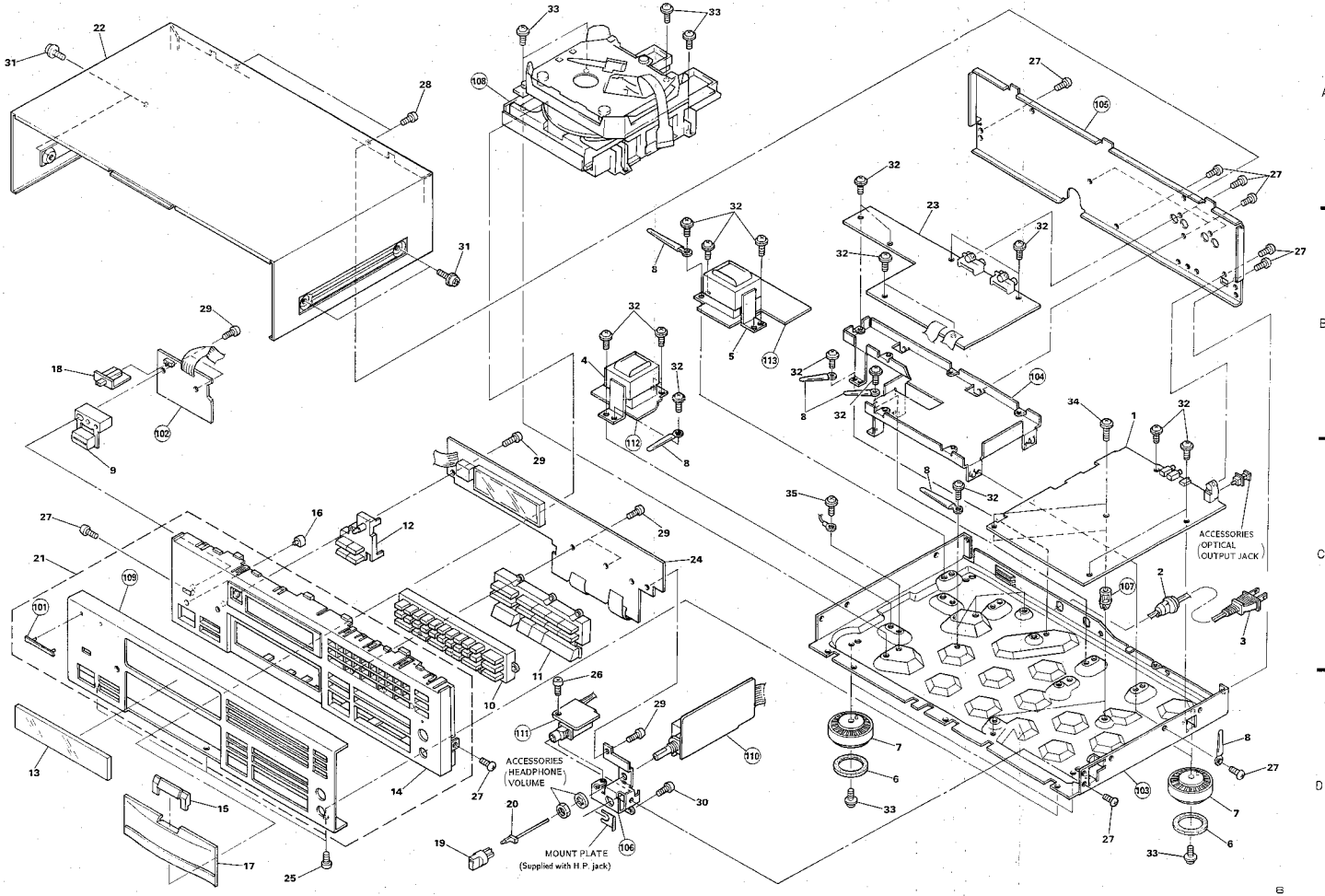
Parts List of Exterior

Mark	No.	Description	Parts No.
⚠◉	1	Mother board assembly	PWM1448
⚠	2	Strain relief	CM-22C
	3	AC power cord	PDG1015
⚠	4	Power transformer S(AC120V)	PTT1179
⚠	5	Power transformer A(AC120V)	PTT1183
	6	Stopper	PNM1134
	7	Insulator	PNW2020
	8	Cord clamper	RNH-184
	9	Power button	PAC1569
	10	Select button	PAC1570
	11	Play button	PAC1571
	12	Search button	PAC1572
	13	Display window	PAM1503
	14	Control panel	PNW1948
	15	Tray lens	PNW1950
	16	LED lens	PNW2019
	17	Tray panel	PNW2025
	18	Slide knob	RAC1428
	19	Knob C	RAC1608
	20	BIAS lens	RNK1674
	21	Front panel assembly	PEA1164
	22	Bonnet	PYY1148
◉	23	Audio board assembly	PWZ2118
◉	24	Operate board assembly	PWZ2112
	25	Screw	BBT30P080FZK
	26	Screw	BBZ30P060FMC
	27	Screw	BBZ30P080FCC
	28	Screw	BBZ30P080FCC
	29	Screw	BBZ30P120FMC
	30	Screw	BBZ30P120FMC
	31	Screw	FBT40P080FZK
	32	Screw	IBZ30P060FCC
	33	Screw	IBZ30P080FCC
	34	Screw	IBZ30P150FCC
	35	Screw	PDZ30P060FCC

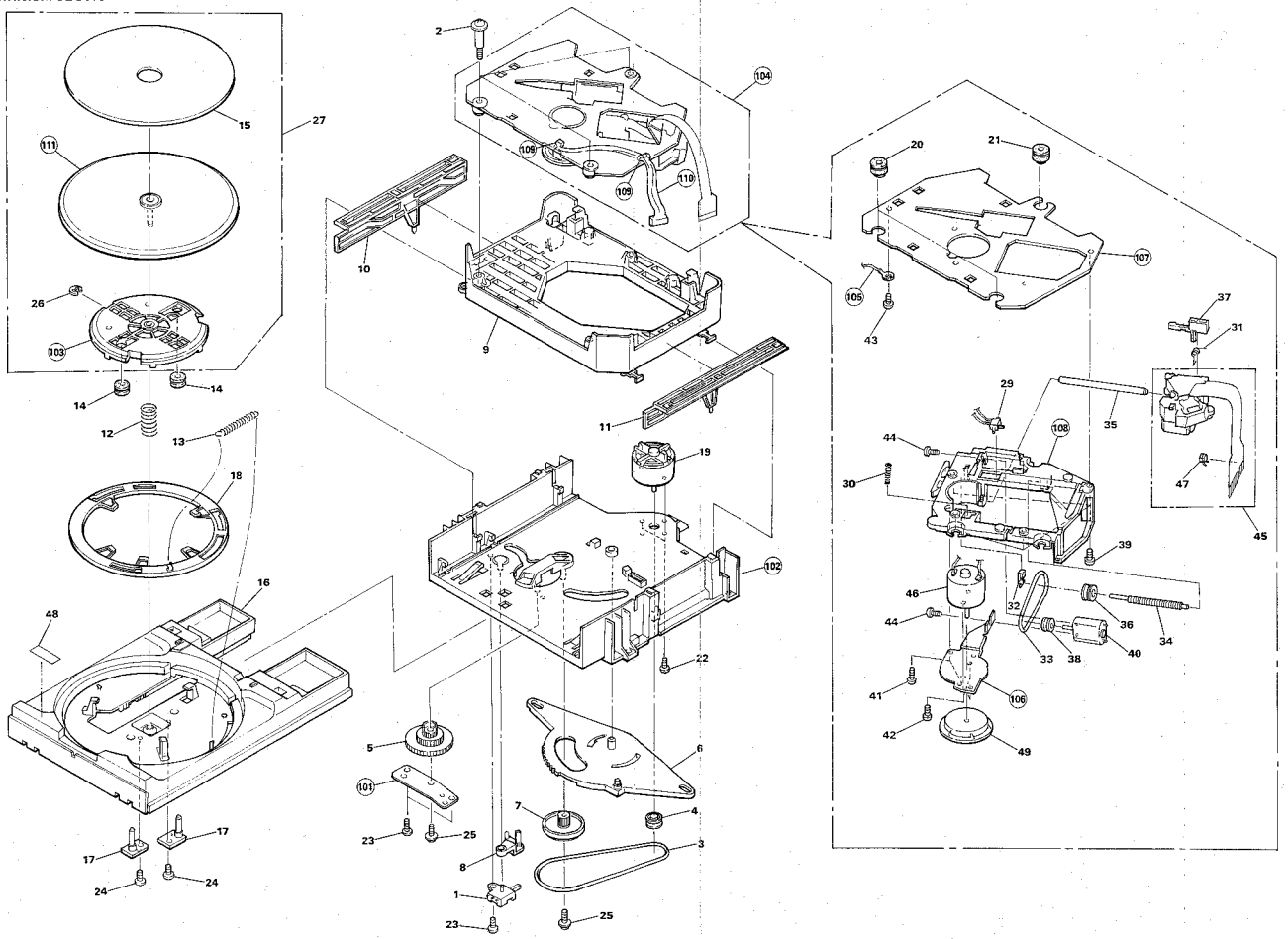
Mark	No.	Description	Parts No.
	101	Name plate(ABS)	
	102	SW board assembly	
	103	Under base	
	104	Audio angle	
	105	Rear base	
	106	Headphone angle	
	107	Spacer	
	108	Loading mechanism assembly	
	109	Front panel	
	110	Headphone board assembly	
	111	Jack board assembly	
	112	S trans board assembly	
	113	A trans board assembly	

* The stopper consist of the big ring part and the small ring part.
If you stik the stopper to the leg, stick the big ring part to the front leg, and the small ring part to the rear leg.




ACCESSORIES
(OPTICAL
OUTPUT JACK)
ACCESSORIES
(HEADPHONE
VOLUME)
MOUNT PLATE
(Supplied with H.P. jack)

2.2 MECHANISM SECTION



Parts List of Mechanism section

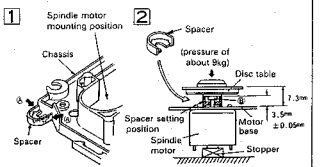
Mark	No.	Description	Parts No.
	1	Lever switch	DSK1003
	2	Screw(steel)	PBA1027
	3	Rubber belt	PEB1186
	4	Motor pulley	PNW1634
	5	Drive gear	PNW1996
	6	Timing lever	PNW1997
	7	Gear pulley	PNW1998
	8	SW head	PNW1999
	9	Float base	PNW2000
	10	Left cam	PNW2001
	11	Right cam	PNW2002
	12	Compression spring	PBH1120
	13	Tention spring	PBH1121
	14	Float(rubber)	PEB1014
	15	Table rubber sheet	PEB1181
	16	Tray	PNW2003
	17	Table guide	PNW2004
	18	Lock plate	PNW2005
	19	DC motor(0.75W)	PXM1010
	20	Rubber bush	PEB1031
	21	Rubber bush	PEB1170
	22	Screw	BMZ26P040FMC
	23	Screw	BPZ26P060FMC
	24	Screw	BPZ26P060FMC
	25	Screw	IPZ20P080FMC
	26	Stop ring	YE26S
	27	Turn table assembly	PEA1165
	29	Push switch	DSG1014
	30	Spring	PBH1009
	31	Spring	PBH1084
	32	Plate spring	PBK1057
	33	Belt(square)	PEB1072
	34	Screw	PLA1003
	35	Guide bar	PLA1071
	36	Pulley	PNW1066
	37	Half nut	PNW1605
	38	Motor pulley	PNW1634
	39	Screw	PBZ30P080FMC
	40	DC motor(1.7W)	PXM1013
	41	Screw	BPZ20P080FZK
	42	Screw	JFZ20P025FMC
	43	Screw	PBZ30P060FMC
	44	Screw	PMZ20P030FMC
	45	Pick up assembly	PEA1030
	46	DC motor assembly(With oil)	PEA1156
	47	Semi-fixed VR(3.3K)	PCP1008
	48	Caution label	PRW1244
	49	Disc table	PNW1067

Mark	No.	Description	Parts No.
	101	Shaft holder	
	102	Loading base	
	103	Table bearings assembly	
	104	Servo mechanism assembly	
	105	Earth lead unit(300V)	
	106	Motor base	
	107	Mechanism base	
	108	Mechanism chassis	
	109	Clamper	
	110	Connector assembly	
	111	Turn table(AL)	

• How to install the disc table

1 Use nippers or other tool to cut the two sections marked Ⓐ in figure 1. Then remove the spacer.

2 While supporting the spindle motor shaft with the stopper, put spacer on top of the motor base (angled so it doesn't touch section Ⓑ), and stick the disc table on top (takes about 9kg pressure). Take off the spacer.



2.3 REMOVE THE TRAY PANEL AND THE TRAY LENS

Hold the tray panel with your hands as the figure shown right, and grasp the tray with your thumbs and then lift the tray panel up while pulling it toward you with the other fingers.(Figs . 1 and 2)

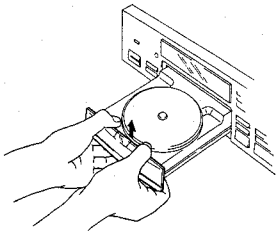


Fig. 1

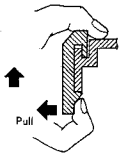


Fig. 2

2.4 INSTALL THE TRAY PANEL AND THE TRAY LENS

Align the tray panel with the grooves located at both edges of the tray while holding the tray lens with you fingers, and then press it down till it stops. (Fig. 3)

Hold the tray panel and the tray as shown in Fig. 4 and slide them down till you hear a click sound while pressing strongly with your thumbs. (Figs. 4 and 5)

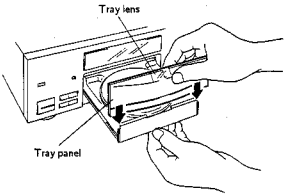


Fig. 3

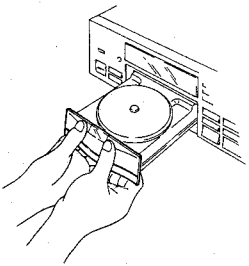


Fig. 4

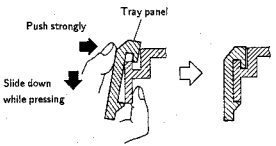


Fig. 5

3. P.C.B.'s PARTS LIST

NOTES :

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561* ····· *RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473* ····· *RD1/4PS 4 7 3 J*
0.5Ω	*0R5*	····· *RD2H 0 R 5 K*
1Ω	*010*	····· *RD1P 0 1 0 K*

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10¹ 5621 ····· *RD1/4SR 5 6 2 1 F*

Mark	No.	Description	Parts No.
	◉**MOTHER BOARD ASSEMBLY (PWM1448 : PD-31/KU type) (PWM1449 : PD-8700/HEM, HB, SD and PD-8700-S/HEWM types)**		
	SEMICONDUCTORS		
⚠	IC20	REGULATOR IC	M5298P
	IC101	PRE AMP IC	CXA1471S
	IC151	SERVO IC	CXA1372S
⚠	IC201,IC202	POWER OP-AMP,IC	LA6520
	IC301	EFM DEMODULATION IC	CXD2500AQ
	Q101	TRANSISTOR	2SA854S
	Q321,Q351	TRANSISTOR	DTC124ES
	Q391	TRANSISTOR	2SC1740S
	Q406	TRANSISTOR	DTA124ES
⚠	D11-D14,D52	DIODE	11ES2
	D54	ZENNER DIODE	MTZJ18B
	D301	DIODE	1SS254
	D391-D394	DIODE(PWM1448 only)	1SS254
	D395-D397	DIODE	1SS254
	COILS		
	L391,L392	AXIAL INDUCTOR	LAUR22K
	L393,L394	AXIAL INDUCTOR	LAU010K
	CAPACITORS		
	C11,C13	CERAMIC CAPACITOR	CKCYF103Z50
	C15,C16	CERAMIC CAPACITOR	CKCYF103Z50
	C25	ELECTR.CAPACITOR	CEAS332M16
	C26	ELECTR.CAPACITOR	CEAS222M16
	C27	ELECTROLYTIC CAPACIT	CEAS471M6R3
	C28	ELECTR.CAPACITOR	CEAS101M10
	C52	ELECTR.CAPACITOR	CEAS101M35
	C60	ELECTR.CAPACITOR	CEAS010M50
	C101,C102	ELECTR.CAPACITOR	CEAS101M10
	C103	CERAMIC CAPACITOR	CCCCH200J50
	C104	ELECTR.CAPACITOR	CEAS101M10
	C110	CERAMIC CAPACITOR	CKCYF103Z50
	C151-C153	ELECTR.CAPACITOR	CEAS101M10
	C155	CERAMIC CAPACITOR	CKCYB182K50
	C156	CERAMIC CAPACITOR	CGCYX333K25
	C157	CERAMIC CAPACITOR	CGCYX103K25
	C158,C159	CERAMIC CAPACITOR	CGCYX104K25
	C160	ELECTR.CAPACITOR	CEAS4R7M50
	C161	CERAMIC CAPACITOR	CGCYX104K25
	C162	ELECTR.CAPACITOR	CEAS010M50
	C163	CERAMIC CAPACITOR	CGCYX104K25
	C164	CERAMIC CAPACITOR	CGCYX103K25
	C167	CERAMIC CAPACITOR	CKCYF103Z50
	C168	CERAMIC CAPACITOR	CGCYX333K25
	C169	CERAMIC CAPACITOR	CGCYX103K25
	C170	CERAMIC CAPACITOR	CKCYB332K50
	C171,C172	CERAMIC CAPACITOR	CKCYB472K50
	C202,C207	CERAMIC CAPACITOR	CKCYF103Z50
	C212	CERAMIC CAPACITOR	CKCYB272K50
	C216,C217	ELECTR.CAPACITOR	CEAS330M16
	C301	CERAMIC CAPACITOR	CGCYX104K25
	C302	ELECTROLYTIC CAPACIT	CEAS471M6R3
	C306	CERAMIC CAPACITOR	CKCYB152K50
	C307	CERAMIC CAPACITOR	CGCYX473K25
	C308	CERAMIC CAPACITOR	CGCYX103K25
	C309	ELECTR.CAPACITOR	CEASR47M50
	C310	CERAMIC CAPACITOR	CKCYF103Z50
	C321	CERAMIC CAPACITOR	CGCYX104K25
	C324	CERAMIC CAPACITOR	CKCYF103Z50
	C361	CERAMIC CAPACITOR	CKCYF103Z50
	C362	CERAMIC CAPACITOR	CKCYB102K50
	C397	CERAMIC CAPACITOR	CKCYF103Z50
	RESISTORS		
	VR102	VR	VRTB6VS223
	VR103	VR	VRTB6VS102
	VR151,VR152	VR	VRTB6VS223
		Other resistors	RD1/6PM□□□J

Mark No.	Description	Parts No.
OTHERS		
	CN101 CONNECTOR	52045-1610
	CN404 CONNECTOR(7P)	KPC7
	JA301 OPTICAL OUTPUT JACK	TOTX178
	JA391,JA392 JACK/12V	PKN1004 (PWM1448 only)
	JA393 JACK	PKN1005

◉OPERATE BOARD ASSEMBLY (PWZ2112)

SEMICONDUCTORS		
	IC701 MICROCOMPUTER,IC	PD4329A
	Q801,Q802 TRANSISTOR	2SD2144S
	Q803,Q804 TRANSISTOR	2SB1296
	Q805,Q806 TRANSISTOR	2SD2144S
	Q807-Q809 TRANSISTOR	DTA124ES
	Q810 TRANSISTOR	DTC124ES
	D701-D714 DIODE	1SS254
SWITCHES		
	S701-S742 SWITCH (1-20, PGM, DELETE, CHECK, CLEAR, >20, RESERVE, REPEAT, TIME, RND, PEAK SEARCH, O/L, HI.LITE SCAN, AUTO SPACE, COMPU, TIME FADE, ⏮, ⏭, ⏪, ⏩, STOP(□), PLAY(▷))	PSG1006
CAPACITORS		
	C701 ELECTR.CAPACITOR	CEAS330M16
	C702-C714 AXIAL CAPACITOR	CKPUYB221K50
RESISTORS		
	All resistors	RD1/6PM□□□J
OTHERS		
	PHOTO SENSOR UNIT	GP1U50X
	V701 FL INDICATOR TUBE	PEL1057
	X701 CERAMIC RESONATOR	VSS1014

SW BOARD ASSEMBLY

SEMICONDUCTORS		
	D715 LED	PCX1018
SWITCHES		
	S743-S748 SWITCH (ON/STN BY, FADE IN(⌒), FADE OUT(⌒), ⌙, ⌙, DISPLAY OFF)	PSG1006
	S749	RSH1017
RESISTORS		
	R710 CARBON FILM RESISTOR	RD1/6PM103J

HEADPHONE BOARD ASSEMBLY

SEMICONDUCTORS		
	IC501 OP-AMP,IC	M5218AL

Mark No.	Description	Parts No.
CAPACITORS		
	C503,C504 CERAMIC CAPACITOR	CKCYF103Z50
RESISTORS		
	VR501 VARIABLE RESISTOR WITH MOTOR 20KB	PCS1006
	Other resistors	RD1/6PM□□□J

JACK BOARD ASSEMBLY

COILS		
	L501-L503 AXIAL INDUCTOR	LAU010K
CAPACITORS		
	C505-C507 CERAMIC CAPACITOR	CKCYF103Z50
OTHERS		
	JA501 JACK	PKN1001

◉AUDIO BOARD ASSEMBLY (PWZ2118)

SEMICONDUCTORS		
	IC801,IC802 D/A CONVERTER,IC	PD2026A
	IC803 LOGIC IC	TC74HCU04AP
	IC808,IC809 OP-AMP IC	NJM5532DD
	IC901 REGULATOR IC	NJM78L12A
	IC902 REGULATOR IC	NJM79L12A
	IC903 REGULATOR IC	NJM7805FA
	D802-D804,D806 DIODE	1SS254
⚠	D901-D908 DIODE	11ES2
CAPACITORS		
	C801,C802 CERAMIC CAPACITOR	CCCCH120J50
	C805,C807 AUDIO FILM CAPACITOR	CFTXA104J50
	C809,C811 AUDIO FILM CAPACITOR	CFTXA104J50
	C812,C813 CERAMIC CAPACITOR	CCCCH390J50
	C819,C820 CERAMIC CAPACITOR	CCCCH390J50
	C821 AUDIO FILM CAPACITOR	CFTXA681J50
	C822 AUDIO FILM CAPACITOR	CFTXA562J50
	C824 ELECTR.CAPACITOR	CEAS470M50
	C825 PL.STYRENE CAPACITOR	CQSA102J50
	C828,C830 AUDIO FILM CAPACITOR	CFTXA104J50
	C832,C834 AUDIO FILM CAPACITOR	CFTXA104J50
	C835,C836 CERAMIC CAPACITOR	CCCCH390J50
	C839,C840 CERAMIC CAPACITOR	CCCCH390J50
	C841 AUDIO FILM CAPACITOR	CFTXA562J50
	C842 AUDIO FILM CAPACITOR	CFTXA681J50
	C843 ELECTR.CAPACITOR	CEAS470M50
	C844-C846 PL.STYRENE CAPACITOR	CQSA102J50
	C860,C861 ELECTR.CAPACITOR	CEAS330M16
	C863,C864 CERAMIC CAPACITOR	CKCYF103Z50
	C870 ELECTROLYTIC CAPACIT	CEAS471M6R3
	C901,C902 ELECTR.CAPACITOR	CEAS102M25
	C903,C904 ELECTR.CAPACITOR	CEAS471M16
	C905 ELECTR.CAPACITOR	CEAS332M16
	C906 ELECTR.CAPACITOR	CEAS102M16
	C914-C919 CERAMIC CAPACITOR	CKCYF103Z50

Mark No.	Description	Parts No.
RESISTORS		
	All resistors	RD1/6PM□□□J
OTHERS		
CN801	CONNECTOR(9P)	KPC9
JA801	JACK	PKB1010
JA802	JACK	PKB1010
X801	XTAL RES (OSC)	PSS1006

S. TRANS BOARD ASSEMBLY

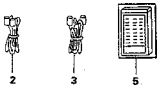
No electrical parts are supplied this assembly.

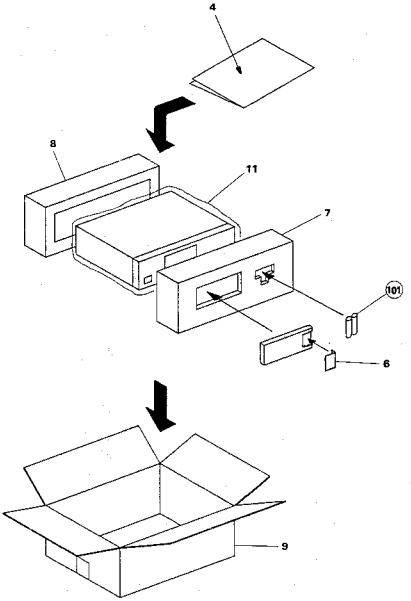
A. TRANS BOARD ASSEMBLY

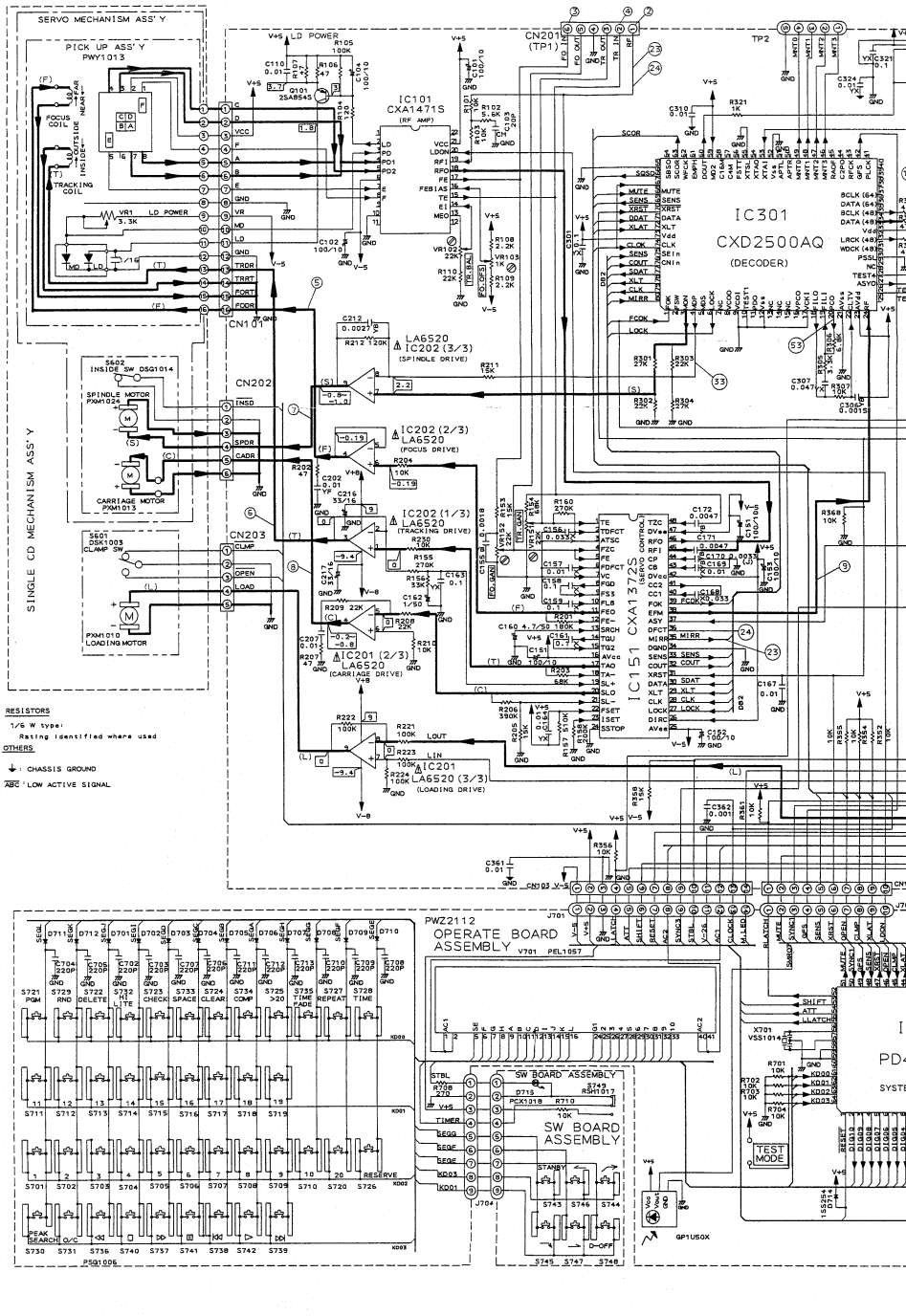
No electrical parts are supplied this assembly.

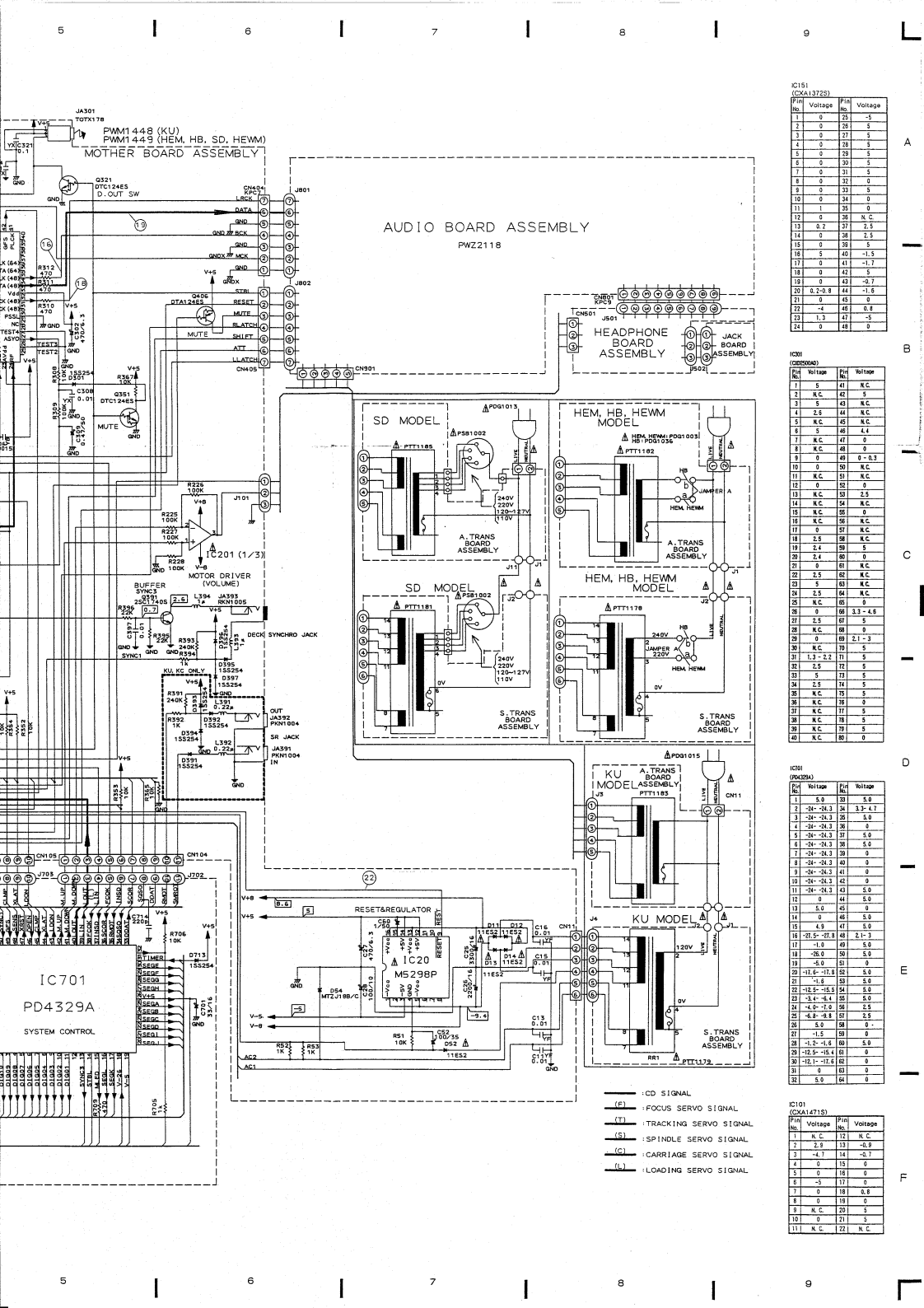
4. PACKING

Mark	No.	Description	Parts No.
	1	. . . . .	
	2	Cord with plug(mini plug)	PDE-319
	3	Cord with plug	PDE1001
	4	Operating instructions (English)	PRB1151
	5	Remote control unit (CU-PD053)	PWW1069
	6	Battery lid	PZN1001
	7	Styrol protector F	PHA1163
	8	Styrol protector R	PHA1164
	9	CD Packing case	PHG1679
	10	. . . . .	
	11	Sheet	Z23-007
	101	Mangan battery(R03, AAA)	






SERVO MECHANISM ASS'Y
PICK UP ASS'Y
PWY1013
SINGLE CD MECHANISM ASS'Y
IC101
CXA1471S
(RF AMP)
IC301
CXD2500AQ
(DECODER)
IC151
CXA1372S
(SERVO CONTROL)
IC202 (3/3)
LA6520
(SPINDLE DRIVE)
IC202 (2/3)
LA6520
(FOCUS DRIVE)
IC202 (1/3)
LA6520
(TRACKING DRIVE)
IC201 (2/3)
LA6520
(CARRIAGE DRIVE)
IC201 (3/3)
LA6520
(LOADING DRIVE)
PWZ2112
OPERATE BOARD
ASSEMBLY
SW BOARD
ASSEMBLY
TEST
MODE
CN101
CN202
CN203
CN201
(TP1)
TP2
LD POWER
FOCUS COIL
TRACKING COIL
SPINDLE MOTOR
PXM1024
CARRIAGE MOTOR
PXM1013
CLAMP SW
DSK1003
LOADING MOTOR
PXM1010
RESISTORS
1/6 W type:
Rating identified where used
OTHERS
: CHASSIS GROUND
: LOW ACTIVE SIGNAL



IC151 (CXA1372S)

Pin No.	Voltage	Pin No.	Voltage
1	0	25	-5
2	0	26	5
3	0	27	5
4	0	28	5
5	0	29	5
6	0	30	5
7	0	31	5
8	0	32	0
9	0	33	5
10	0	34	0
11	1	35	0
12	0	36	N.C.
13	0.2	37	2.5
14	0	38	2.5
15	0	39	5
16	5	40	-1.5
17	0	41	-1.7
18	0	42	5
19	0	43	-0.7
20	0.2-0.8	44	-1.6
21	0	45	0
22	-4	46	0.8
23	1.3	47	-5
24	0	48	0

IC301 (CXD2500AQ)

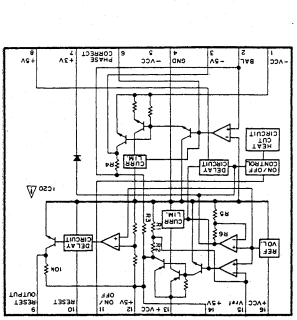
Pin No.	Voltage	Pin No.	Voltage
1	5	41	N.C.
2	N.C.	42	5
3	5	43	N.C.
4	2.6	44	N.C.
5	N.C.	45	N.C.
6	5	46	4.4
7	N.C.	47	0
8	N.C.	48	0
9	0	49	0 - 0.3
10	0	50	N.C.
11	N.C.	51	N.C.
12	0	52	0
13	N.C.	53	2.5
14	N.C.	54	N.C.
15	N.C.	55	0
16	N.C.	56	N.C.
17	0	57	N.C.
18	2.5	58	N.C.
19	2.4	59	5
20	2.4	60	0
21	0	61	N.C.
22	2.5	62	N.C.
23	5	63	N.C.
24	2.5	64	N.C.
25	N.C.	65	0
26	0	66	3.3 - 4.6
27	2.5	67	5
28	N.C.	68	0
29	0	69	2.1 - 3
30	N.C.	70	5
31	1.3 - 2.2	71	5
32	5	72	5
33	5	73	5
34	2.5	74	5
35	N.C.	75	5
36	N.C.	76	0
37	N.C.	77	5
38	N.C.	78	5
39	N.C.	79	5
40	N.C.	80	0

IC701 (PD4329A)

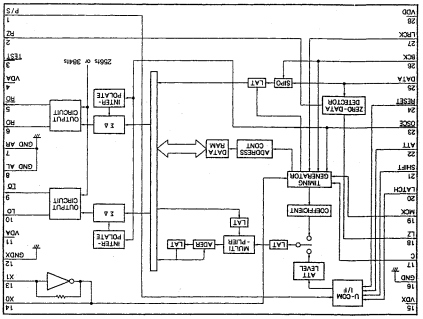
Pin No.	Voltage	Pin No.	Voltage
1	5.0	33	5.0
2	-24- -24.3	34	3.3- 4.7
3	-24- -24.3	35	5.0
4	-24- -24.3	36	0
5	-24- -24.3	37	5.0
6	-24- -24.3	38	5.0
7	-24- -24.3	39	0
8	-24- -24.3	40	0
9	-24- -24.3	41	0
10	-24- -24.3	42	0
11	-24- -24.3	43	5.0
12	0	44	5.0
13	5.0	45	0
14	0	46	5.0
15	4.9	47	5.0
16	-21.5- -21.8	48	2.1- 3
17	-1.8	49	5.0
18	-26.0	50	5.0
19	-5.0	51	0
20	-11.6- -11.8	52	5.0
21	-1.8	53	5.0
22	-12.5- -15.5	54	5.0
23	-3.4- -6.4	55	5.0
24	-4.0- -7.0	56	2.5
25	-6.8- -9.8	57	2.5
26	-2.3	58	0 -
27	-1.5	59	0
28	-1.2- -1.6	60	5.0
29	-12.5- -15.4	61	0
30	-12.1- -17.6	62	0
31	0	63	0
32	5.0	64	0

IC101 (CXA1471S)

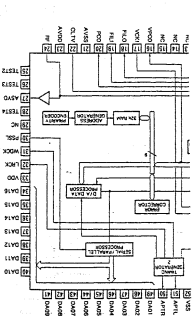
Pin No.	Voltage	Pin No.	Voltage
1	N. C.	12	N. C.
2	2.9	13	-0.9
3	-4.7	14	-0.7
4	0	15	0
5	0	16	0
6	-5	17	0
7	0	18	0.8
8	0	19	0
9	N. C.	20	5
10	0	21	5
11	N. C.	22	N. C.



IC20
MC5298P



IC401
PD2026A



5. SCHEMATIC DIAGRAM AND P.C.BOARDS CONNECTION DIAGRAM

5.1 Wave Forms

Note:The encircled numbers denote measuring in the schematic diagram.

*1 50T-JUMP:After switching to the pause mode, press the manual search key.

*2 FOCUS-IN:Press the key without loading a disc.

② TP1-Pin 1:PLAY MODE (RF) 500mV/div 500nsec/div — GND

⑤ IC202-Pin 4 : FOCUS-IN(*2)MODE (FODR) 1V/div 200msec/div — GND

⑦ IC202-Pin 9 : TRACK SEARCH MODE (SPDR) 2V/div 50msec/div — GND

⑪ IC801-Pin 10 : PLAY MODE(1kHz) (LO) (D/A DATA OUT) 1V/div 200 μ sec/div — GND

⑫ IC2 (R 2V

② TP1-Pin 1:TRACK SEARCH MODE (RF) 500mV/div 200 μ sec/div — GND

⑤ IC202-Pin 4 : PLAY MODE (FODR) 1V/div 1msec/div — GND

⑧ IC201-Pin 4:PLAY MODE (CADR) 1V/div 2sec/div — GND

⑯ IC301-Pin 35:PLAY MODE (1kHz) (BCLK) 2V/div 500nsec/div — GND

⑫ IC2 (R 2V

③ TP1-Pin 6:PLAY MODE (FOER) 100mV/div 10msec/div — GND

⑥ IC202-Pin 3:PLAY MODE (TRDR) 500mV/div 1msec/div — GND

⑧ IC201-Pin 4:TRACK SEARCH MODE (CADR) 2V/div 200msec/div — GND

⑱ IC301-Pin 32:PLAY MODE (1kHz) (LRCK) 2V/div 10 μ sec/div — GND

⑬ Up Low

④ TP1-Pin 2:PLAY MODE (TRER) 1V/div 10msec/div — GND

⑥ IC202-Pin 3:50T-JUMP (*1) MODE (TRDR) 500mV/div 1msec/div — GND

⑨ IC151-Pin 38:PLAY MODE (EFM) 2V/div 500nsec/div — GND

⑲ IC301-Pin 34:PLAY MODE (1kHz) (DATA) 2V/div 500nsec/div — GND

⑭ Up Low

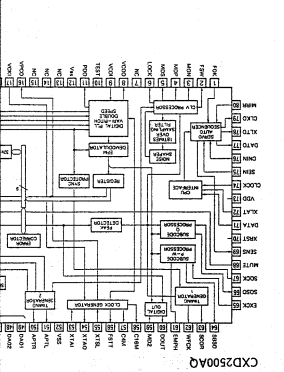
④ TP1-Pin 2:50T-JUMP (*1) MODE (TRER) 1V/div 1msec/div — GND

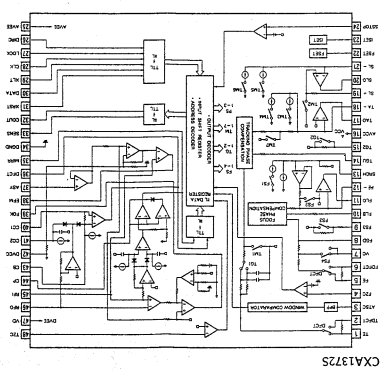
⑦ IC202-Pin 9 : PLAY MODE (SPDR) 1V/div 50msec/div — GND

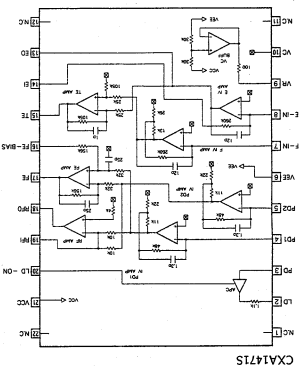
⑩ IC801-Pin 9 : PLAY MODE(1kHz) (LO) (D/A DATA OUT) 1V/div 200 μ sec/div — GND

㉑ Pin-OUTPUT:PLAY MODE(1kHz) 1V/div 200μsec/div — GND

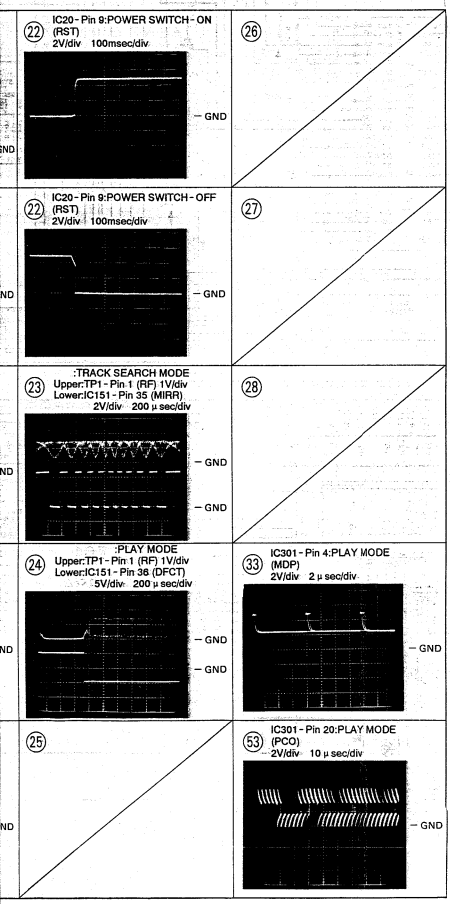
⑮







● IC BLOCK DIAGRAM



1.RESISTORS :
Indicated in Ω, 1/4W, 1/6W and 1/8W, ±5% tolerance unless otherwise noted
k ; kΩ M ; MΩ (F) ; ±1%, (G) ; ±2%, (K) ; ±10%, (M) ; ±20% tolerance.

2.CAPACITORS :
Indicated in capacity (μF)/voltage(V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

3.VOLTAGE, CURRENT :
; DC voltage (V) at play state.
; DC current at play state.
Value in ( ) is DC current at stop state.

4.OTHERS :
➔ ; Signal route.
Ø ; Adjusting point
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES : (The underlined indicates the switch position)
SWITCH BOARD ASSEMBLY
S743 : POWER ON-OFF

OPERATE BOARD ASSEMBLY

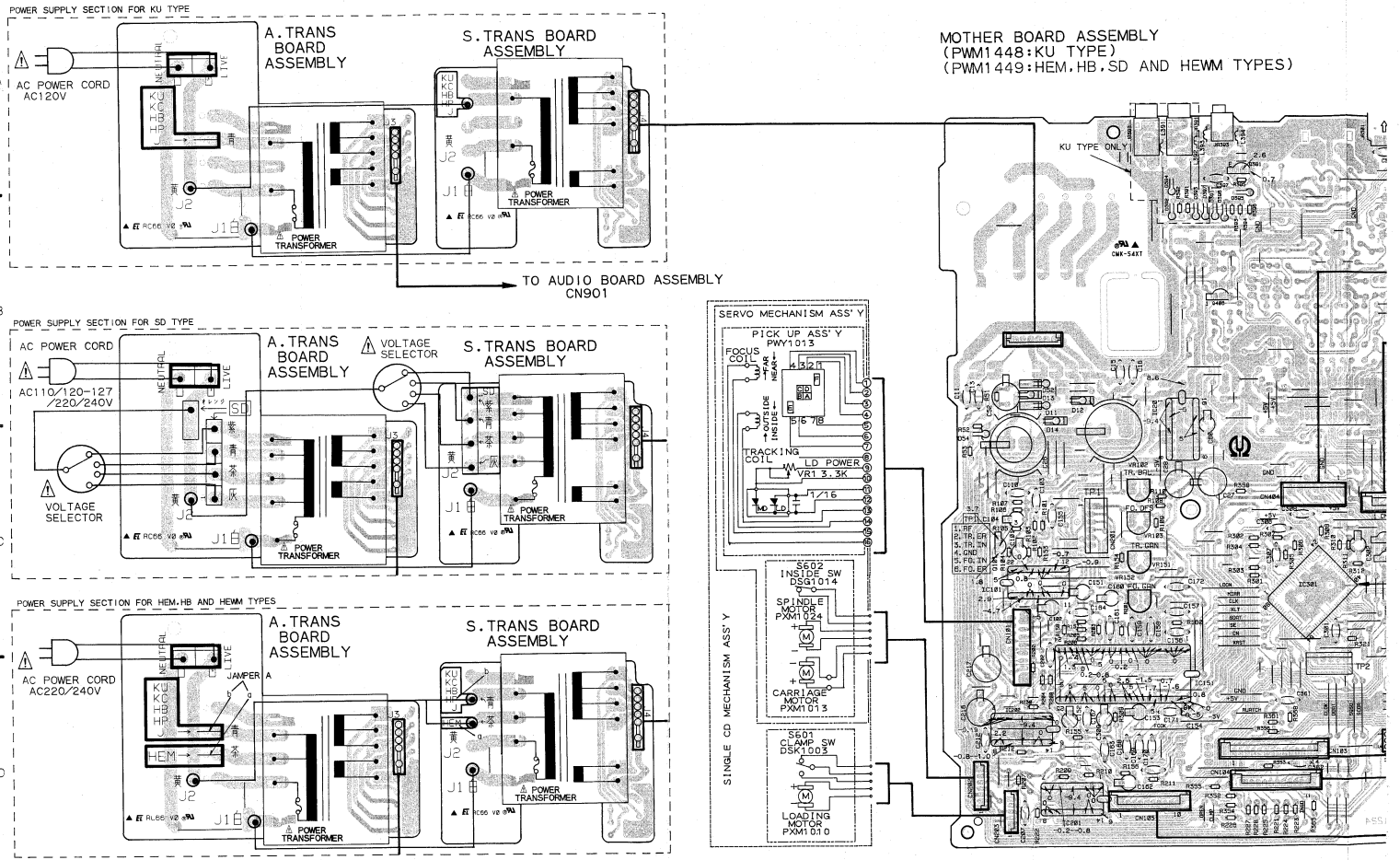
S701 : 1	S725 : >20
S702 : 2	S726 : RESERVE
S703 : 3	S727 : REPEAT
S704 : 4	S728 : TIME
S705 : 5	S729 : RND
S706 : 6	S730 : PEAK SEARCH
S707 : 7	S731 : O/L
S708 : 8	S732 : HI LITE SCAN
S709 : 9	S733 : AUTO SPACE
S710 : 10	S734 : COMPU ┐ EDIT
S711 : 11	S735 : TIME FADE ┘
S712 : 12	S736 : ⏮ ┐ MANUAL SEARCH
S713 : 13	S737 : ⏭ ┘
S714 : 14	S738 : ⏮ ┐ TRACK SEARCH
S715 : 15	S739 : ⏭ ┘
S716 : 16	S740 : STOP(□)
S717 : 17	S741 : PAUSE(‖)
S718 : 18	S742 : PLAY(▷)
S719 : 19	(S743 : ON/STN BY)
S720 : 20	S744 : FADE IN(⌒)
S721 : PGM	S745 : FADE OUT(⌒)
S722 : DELETE	S746 : ← ┐ INDEX
S723 : CHECK	S747 : → ┘
S724 : CLEAR	S748 : DISPLAY OFF

Line Voltage Selection (For HB,HEM and HEWM types)
Line voltage can be changed with the following steps.
1. Disconnect the AC power cord.
2. Remove the top cover.
3.Change the position of the jumper wire A as follows

Voltage	Jumper wire A position
220V	a
240V	b

4. Stick the line voltage label on the rear panel.

Parts No.	Description
AXX-193	220V label
AXX-192	240V label

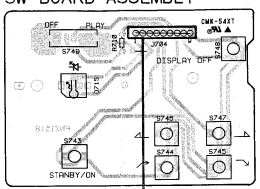

POWER SUPPLY SECTION FOR KU TYPE
A.TRANS BOARD ASSEMBLY
S.TRANS BOARD ASSEMBLY
AC POWER CORD AC120V
NEUTRAL
LIVE
HOT
COOL
KU
KC
HB
HEM
POWER TRANSFORMER
TO AUDIO BOARD ASSEMBLY CN901
POWER SUPPLY SECTION FOR SD TYPE
AC POWER CORD
AC110/120-127 /220/240V
VOLTAGE SELECTOR
SD
POWER SUPPLY SECTION FOR HEM,HB AND HEWM TYPES
AC POWER CORD AC220/240V
JAMPER A
MOTHER BOARD ASSEMBLY
(PWM1448:KU TYPE)
(PWM1449:HEM,HB,SD AND HEWM TYPES)
KU TYPE ONLY
SERVO MECHANISM ASS'Y
PICK UP ASS'Y PWY1013
FOCUS COIL
TRACKING COIL
LD POWER VR1 3.3K
SINGLE CD MECHANISM ASS'Y
S602 INSIDE SW DSG1014
SPINDLE MOTOR PXM1024
CARRIAGE MOTOR PXM1013
S601 CLAMP SW DSK1003
LOADING MOTOR PXM1010

TYPES)

IC301
(CXD2500AQ)

Pin No.	Voltage	Pin No.	Voltage
1	5	41	N.C.
2	N.C.	42	5
3	5	43	N.C.
4	2.6	44	N.C.
5	N.C.	45	N.C.
6	5	46	4.4
7	N.C.	47	0
8	N.C.	48	0
9	0	49	0 ~ 0.3
10	0	50	N.C.
11	N.C.	51	N.C.
12	0	52	0
13	N.C.	53	2.5
14	N.C.	54	N.C.
15	N.C.	55	0
16	N.C.	56	N.C.
17	0	57	N.C.
18	2.5	58	N.C.
19	2.4	59	5
20	2.4	60	0
21	0	61	N.C.
22	2.5	62	N.C.
23	5	63	N.C.
24	2.5	64	N.C.
25	N.C.	65	0
26	0	66	3.3 ~ 4.6
27	2.5	67	5
28	N.C.	68	0
29	0	69	2.1 ~ 3
30	N.C.	70	5
31	1.3 ~ 2.2	71	5
32	2.5	72	5
33	5	73	5
34	2.5	74	5
35	N.C.	75	5
36	N.C.	76	0
37	N.C.	77	5
38	N.C.	78	5
39	N.C.	79	5
40	N.C.	80	0

SW BOARD ASSEMBLY



IC701
(PD4329A)

Pin No.	Voltage	Pin No.	Voltage
1	5.0	33	5.0
2	-24 ~ -24.3	34	3.3 ~ 4.1
3	-24 ~ -24.3	35	5.0
4	-24 ~ -24.3	36	0
5	-24 ~ -24.3	37	5.0
6	-24 ~ -24.3	38	5.0
7	-24 ~ -24.3	39	0
8	-24 ~ -24.3	40	0
9	-24 ~ -24.3	41	0
10	-24 ~ -24.3	42	0
11	-24 ~ -24.3	43	5.0
12	0	44	5.0
13	5.0	45	0
14	0	46	5.0
15	4.9	47	5.0
16	-27.5 ~ -27.8	48	2.1 ~ 3
17	-1.0	49	5.0
18	-28.0	50	5.0
19	-5.0	51	0
20	-17.6 ~ -17.8	52	5.0
21	-1.6	53	5.0
22	-12.5 ~ -15.5	54	5.0
23	-3.4 ~ -9.4	55	5.0
24	-4.0 ~ -7.6	56	2.5
25	-6.6 ~ -9.8	57	2.5
26	5.0	58	0
27	-1.5	59	0
28	-1.2 ~ -1.6	60	5.0
29	-12.5 ~ -15.4	61	0
30	-12.1 ~ -17.6	62	0
31	0	63	0
32	5.0	64	0

P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
		FET			Mylar capacitor
		Diode			Styrol capacitor
		Zenner diode			Electrolytic capacitor (Non polarized)
		LED			Electrolytic capacitor (Noiseless)
		Varactor			Electrolytic capacitor (Polarized)
		Tact switch			Electrolytic capacitor (Polarized)
		Inductor			Power capacitor
		Coil			Semi-fixed resistor
		Transformer			Resistor array
		Filter			Resistor
					Resonator
					Thermistor

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

This P.C.B. connection diagram is viewed from the foil side.

(TYPE5)

SW BOARD ASSEMBLY

OPERATE BOARD ASSEMBLY(PWZ2112)

TO AUDIO BOARD ASSEMBLY J801

TO AUDIO BOARD ASSEMBLY J802

TO HEADPHONE BOARD ASSEMBLY CN501

MOTHER BOARD ASSEMBLY
(PWM1448:KU TYPE)
(PWM1449:HEM,HB,SD AND HEWM TYPES)

KU TYPE ONLY

SERVO MECHANISM ASS'Y

PICK UP ASS'Y
PWY1013

FOCUS COIL

TRACKING COIL

LD POWER
VR1 3.3K

SLED STEP MOTOR

SW602
INSIDE SW
DSW1074

SPINDLE MOTOR
PWM1024

CARRIAGE MOTOR
PWM1013

SW601
CLAMP SW
DSW1005

LOADING MOTOR
PWM1010

SIMPLE CD MECHANISM ASS'Y

TO AUDIO BOARD ASSEMBLY
CN901

POWER SUPPLY SECTION FOR KU TYPE

A.TRANS BOARD ASSEMBLY

S.TRANS BOARD ASSEMBLY

AC POWER CORD
AC120V

POWER TRANSFORMER

POWER SUPPLY SECTION FOR SD TYPE

A.TRANS BOARD ASSEMBLY

S.TRANS BOARD ASSEMBLY

VOLTAGE SELECTOR

AC POWER CORD
AC110/120-127
220/240V

POWER SUPPLY SECTION FOR HEM,HB AND HEWM TYPES

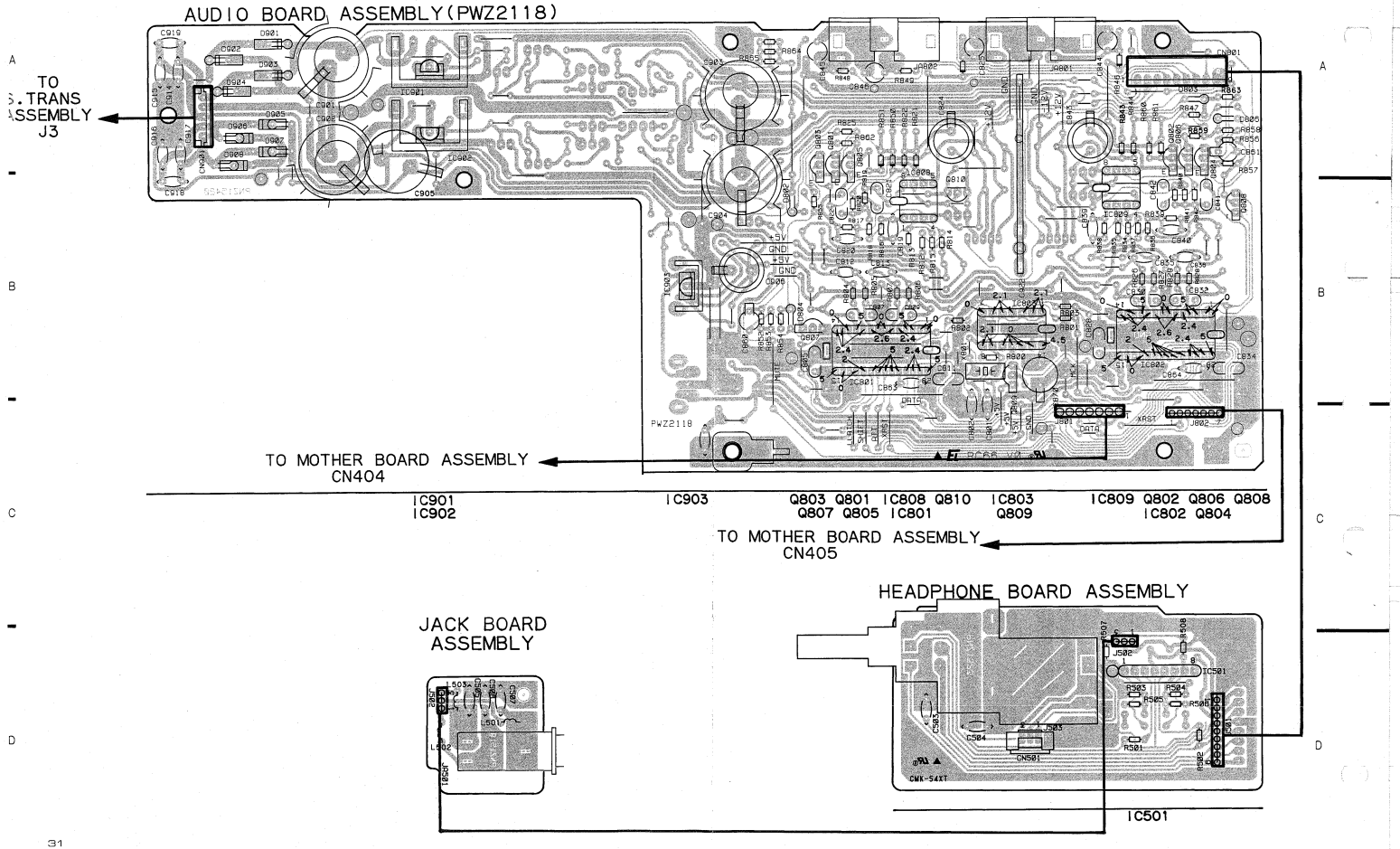
A.TRANS BOARD ASSEMBLY

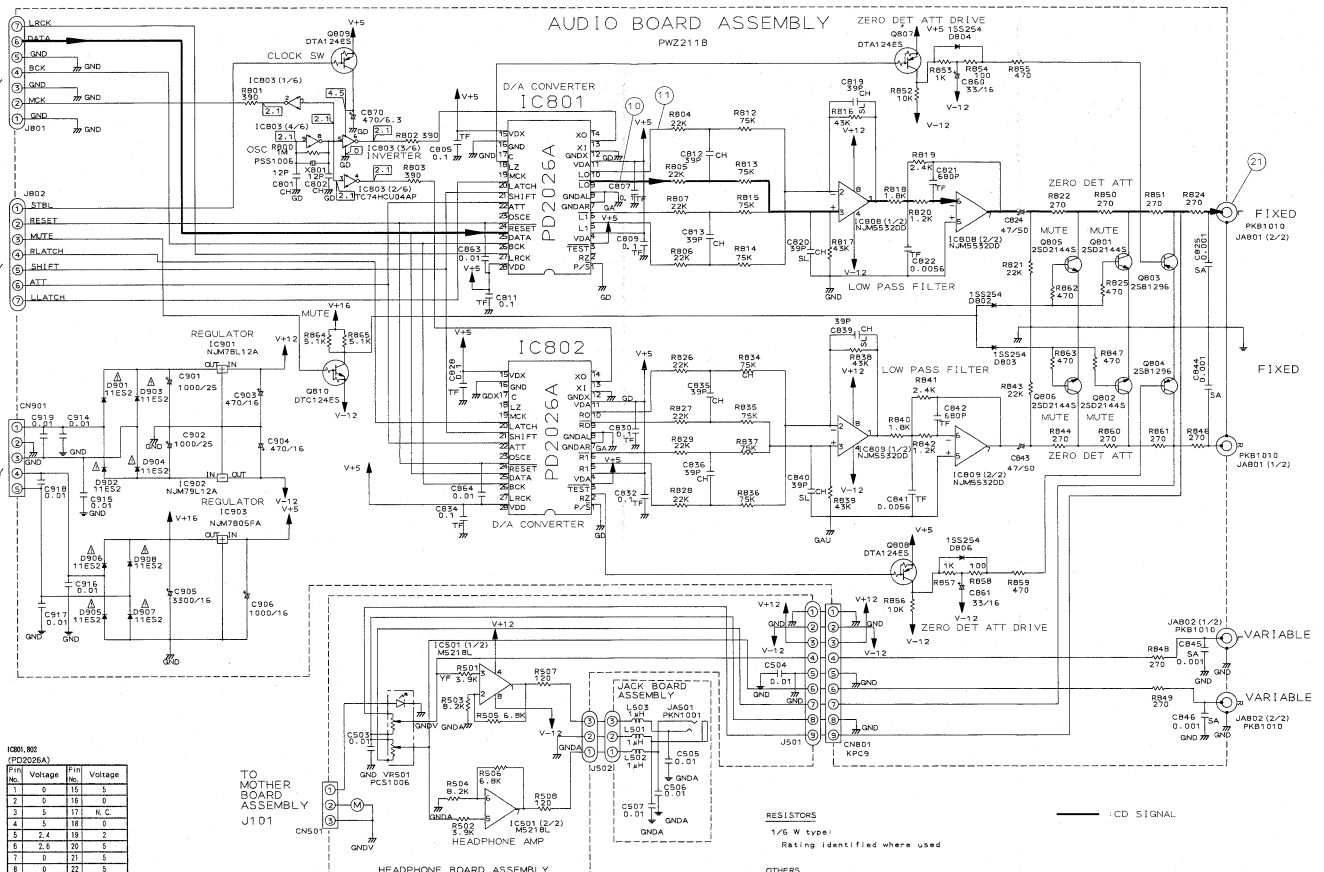
S.TRANS BOARD ASSEMBLY

AC POWER CORD
AC220/240V

1AMPERE

This P.C.B. connection diagram is viewed from the foil side.


AUDIO BOARD ASSEMBLY(PWZ2118)
TO
S.TRANS
ASSEMBLY
J3
TO MOTHER BOARD ASSEMBLY
CN404
IC901
IC902
IC903
Q803 Q801 IC808 Q810
Q807 Q805 IC801
IC803
Q809
IC809 Q802 Q806 Q808
IC802 Q804
TO MOTHER BOARD ASSEMBLY
CN405
HEADPHONE BOARD ASSEMBLY
JACK BOARD
ASSEMBLY
IC501
PWZ2118



IC801, 802
(PD2026A)

Pin No.	Voltage	Pin No.	Voltage
1	0	15	5
2	0	16	0
3	5	17	N. C.
4	5	18	0
5	2.4	19	2
6	2.6	20	5
7	0	21	5
8	0	22	5
9	2.6	23	5
10	2.4	24	5
11	5	25	2.4
12	0	26	2.4
13	2.4	27	2.4
14	2.4	28	5

6. ADJUSTMENTS

6.1 ADJUSTMENT METHODS

If a disc player is adjusted incorrectly or inadequately, it may malfunction or not work at all even though there is nothing at all wrong with the pickup or the circuitry. Adjust correctly following the adjustment procedure.

● Adjustment items/verification items and order

Step	Item	Test point	Adjustment location
1	Focus offset adjustment	TP1, Pin 6 (FCS. ERR)	VR103 (FCS. OFS)
2	Grating adjustment	TP1, Pin 2 (TRK. ERR)	Grating adjustment slit
3	Tracking error balance adjustment	TP1, Pin 2 (TRK. ERR)	VR102 (TRK. BAL)
4	Pickup radial/tangential direction tilt adjustment	TP1, Pin 1 (RF)	Radial tilt adjustment screw, Tangential tilt adjustment screw
5	RF level adjustment	TP1, Pin 1 (RF)	VR1 (RF level)
6	Focus servo loop gain adjustment	TP1, Pin 5 (FCS. IN) TP1, Pin 6 (FCS. ERR)	VR152 (FCS. GAN)
7	Tracking servo loop gain adjustment	TP1, Pin 3 (TRK. IN) TP1, Pin 2 (TRK. ERR)	VR151 (TRK. GAN)
8	Focus error signal verification	TP1, Pin 6 (FCS. ERR)	————

● **Abbreviation table**

FCS. ERR :Focus Error
FCS. OFS :Focus Offset
TRK. ERR :Tracking Error
TRK. BAL :Tracking Balance
FCS. GAN :Focus Gain
TRK. GAN :Tracking Gain
FCS. IN :Focus In
TRK. IN :Tracking In

● Measuring instruments and tools

1. Dual trance oscilloscope (10:1 probe)
2. Low-frequency oscillator
3. Test disc (YEDS-7)
4. 12-cm disc (with at least about 70 minutes recording)
5. Low-pass filter (39 kΩ + 0.001 μF)
6. Resistor (100 kΩ)
7. Hexagonal wrench (M3 mm)
8. Standard tools

● Test point and adjustment variable resistor positions

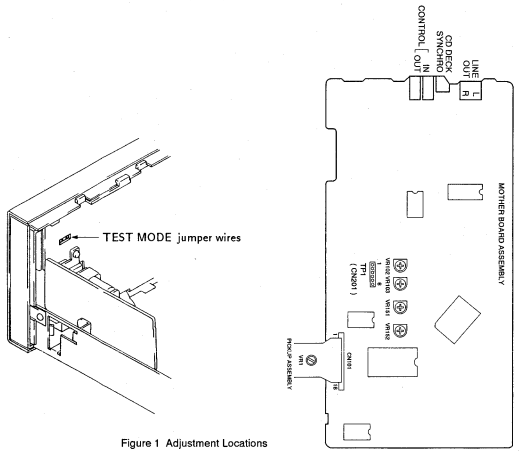


Figure 1 Adjustment Locations

● Notes

1. Use a 10:1 probe for the oscilloscope.
2. All the knob positions (settings) for the oscilloscope in the adjustment procedures are for when a 10:1 probe is used.

● Test mode

These models have a test mode so that the adjustments and checks required for service can be carried out easily. When these models are in test mode, the keys on the front panel work differently from normal. Adjustments and checks can be carried out by operating these keys with the correct procedure. For these models, all adjustments are carried out in test mode.

[Setting these models to test mode]

How to set this model into test mode.

1. Unplug the power cord from the AC socket.
2. Short the test mode jumper wires. (See Figure 1.)
3. Plug the power cord back into the AC socket.

When the test mode is set correctly, the display is different from what it usually is when the power is turned on. If the display is still the same as usual, test mode has not been set correctly, so repeat Steps 1 – 3.

[Release from test mode]

Here is the procedure for releasing the test mode:

1. Press the STOP key and stop all operations.
2. Unplug the power cord from the AC socket.

[Operations of the keys in test mode]

Code	Key name	Function in test mode	Explanation
	PROGRAM	Focus servo close	The laser diode is lit up and the focus actuator is lowered, then raised slowly and the focus servo is closed at the point where the objective lens is focused on the disc. With the player in this state, if you lightly rotate the stopped disc by hand, you can hear the sound the focus servo. If you can hear this sound, the focus servo is operating correctly. If you press this key with no disc mounted, the laser diode lights up, the focus actuator is pulled down, then the actuator is raised and lowered twice and returned to its original position.
▷	PLAY	Spindle servo ON	Starts the spindle motor in the clockwise direction and when the disc rotation reaches the prescribed speed (about 500 rpm at the inner periphery), sets the spindle servo in a closed loop. Be careful. Pressing this key when there is no disc mounted makes the spindle motor run at the maximum speed. If the focus servo does not go correctly into a closed loop or the laser light shines on the mirror section at the outermost periphery of the disc, the same symptom is occurred.
□□	PAUSE	Tracking servo close/open	Pressing this key when the focus servo and spindle servo are operating correctly in closed loops puts the tracking servo into a closed loop, displays the track number being played back and the elapsed time on the front panel, and outputs the playback signal. If the elapsed time is not displayed or not counted correctly or the audio is not played back correctly, it may be that the laser is shining on the section with no sound recorded at the outer edge of the disc, that something is out of adjustment, or that there is some other problem. This key is a toggle key and open/close the tracking servo alternately. This key has no effect if no disc is mounted.

Code	Key name	Function in test mode	Explanation
◁◁	MANUAL SEARCH REV	Carriage reverse (inwards)	Moves the pickup position toward the inner diameter of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the motor does not automatically stop at the mechanical end point in test mode, be careful with this operation.
▷▷	MANUAL SEARCH FWD	Carriage forward (outwards)	Moves the pickup position toward the outer diameter of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the motor does not automatically stop at the mechanical end point in test mode, be careful with this operation.
□	STOP	Stop	Switches off all the servos and initialized. The pickup remains where it was when this key was pressed.
⏏	OPEN/CLOSE	Disc tray open/close	Open/close the disc tray. This key is a toggle key and open/close tray altenately. Pressing this key when the disc is turning stops the disc, then opens the tray. This key operation does not affect the position of the pickup.

[How to play back a disc in test mode]

In test mode, since the servos operate independently, playing back a disc requires that you operate the keys in the correct order to close the servos.
Here is the key operation sequence for playing back a disc in test mode.

PROGRAM	Lights up the laser diode and closes the focus servo.
⇩	
PLAY ▷	Starts the spindle motor and closes the spindle servo.
⇩	
PAUSE ▯▯	Closes the tracking servo.

Wait at least 2-3 seconds between each of these operations.

1. Focus Offset Adjustment

● Objective	Sets the DC offset for the focus error amp.		
● Symptom when out of adjustment	The model does not focus in and the RF signal is dirty.		
● Measurement instrument connections	Connect the oscilioscope to TP1, Pin 6 (FCS. ERR)	● Player state	Test mode, stopped (just the Power switch on)
	[Settings] 5 mV/division 10 ms/division DC mode	● Adjustment location	VR103 (FCS. OFS)
		● Disc	None needed

[Procedure]

Adjust VR103 (FCS. OFS) so that the DC voltage at TP1, Pin 6 (FCS. ERR) is -150 ± 50 mV.

2. Grating Adjustment

● Objective ● Symptom when out of adjustment	To align the tracking error generation laser beam spots to the optimum angle on the track. Play does not start, track search is impossible, tracks are skipped.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK. ERR) via a low pass filter. (See Figure 2) [Settings] 50 mV/division 5 ms/division DC mode	● Player state ● Adjustment location ● Disc	Test mode, focus and spindle servos closed and tracking servo open Pickup grating adjustment slit 12-cm disc. (YEDS-7 can not be used.)

[Procedure]

1. Move the pickup to the outer edge of the disc with the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key.
2. Press the PROGRAM key, then the PLAY ▷ key in that order to close the focus servo then the spindle servo.
3. Insert an ordinary screwdriver into the grating adjustment slit and adjust the grating to find the null point. For more details, see the next page.
4. If you slowly turn the screwdriver clockwise from the null point, the amplitude of the wave gradually increases, then if you continue turning the screwdriver, the amplitude of the wave becomes smaller again. Turn the screwdriver clockwise from the null point and set the grating to the first point where the wave amplitude reaches its maximum.

   Reference : Figure 3 shows the relation between the angle of the tracking beam with the track and the waveform.

   Note : The amplitude of the tracking error signal is about 3 Vp-p (when a 39 kΩ + 0.001 μF low pass filter is used). If this amplitude is extremely small (2 Vp-p or less), the objective lens or the pickup malfunction may be the cause. If the difference between the amplitude of the error signal at the innermost edge and outermost edge of the disc is more than 10%, the grating is not adjusted to the optimum point, so adjust it again.
5. Return the pickup to more or less midway across the disc with the MANUAL SEARCH REV ◁◁ key, press the PAUSE ▯▯ key and double check that the track number and elapsed time are displayed on the front panel. If they are not displayed at this time or the elapsed time changes irregularly, double check the null point and adjust the grating again.

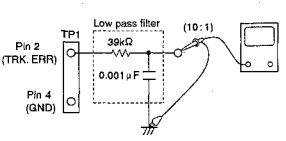
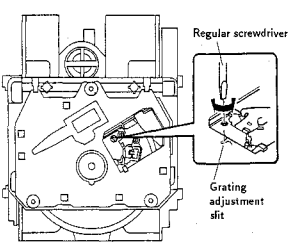


Figure 2



Adjustment locations

[How to find the null point]

When you insert the regular screwdriver into the slit for the grating adjustment and change the grating angle, the amplitude of the tracking error signal at TP1, Pin 2 changes. Within the range for the grating, there are five or six locations where the amplitude of the wave reaches a minimum. Of these five or six locations, there is only one at which the envelope of the waveform is smooth. This location is where the three laser beams divided by the grating are all right above the same track. (See Figure 3.)
This point is called the null point. When adjusting the grating, this null point is found and used as the reference position.

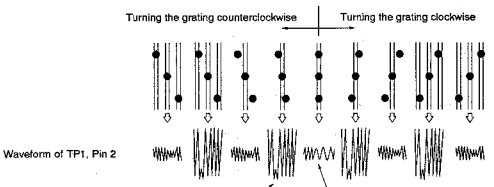
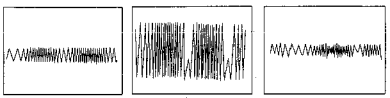


Figure 3



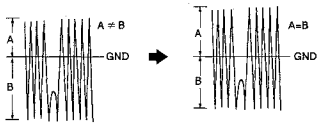
Null point waveform | Maximum amplitude waveform | Waveform other than the null point

3. Tracking Error Balance Adjustment

● Objective	To correct for the variation in the sensitivity of the tracking photodiode.		
● Symptom when out of adjustment	Play does not start or track search is impossible.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK. ERR). This connection may be via a low pass filter. [Settings] 50 mV/division 5 ms/division DC mode	● Player state ● Adjustment location ● Disc	Test mode, focus and spindle servos closed and tracking servo open VR102 (TRK. BAL) YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R=35 mm) with the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key.
2. Press the PROGRAM key, then the PLAY ▷ key in that order to close the focus servo then the spindle servo.
3. Line up the bright line (ground) at the center of the oscilloscope screen and put the oscilloscope into DC mode.
4. Adjust VR102 (TRK. BAL) so that the positive amplitude and negative amplitude of the tracking error signal at TP1, Pin 2 (TRK. ERR) are the same (in other words, so that there is no DC component).



When there is a DC component

When there is no DC component

4. Pickup Radial/Tangential Tilt Adjustment

● Objective	To adjust the angle of the pickup relative to the disc so that the laser beams are shone straight down into the disc for the best read out of the RF signals.		
● Symptom when out of adjustment	Sound broken;some discs can be played but not others.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 20 mV/division 200 ns/division AC mode	● Player state ● Adjustment location ● Disc	Test mode, play Pickup radial tilt adjustment screw and tangential tilt adjustment screw 12-cm disc. (YEDS-7 can not be used.)

[Procedure]

1. Press the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key so that the radial/tangential tilt screws can be adjusted. Press the PROGRAM key, the PLAY ▷ key, then the PAUSE ▯▯ key in that order to close the focus servo then the spindle servo and put the player into play mode.
2. First, adjust the radial tilt adjustment screw with a Phillips screwdriver so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly.
3. Next, adjust the tangential tilt adjustment screw with a Phillips screwdriver so that the eye pattern (the diamond shappe at the center of the RF signal) can be seen the most clearly(Figure 5).
4. Adjust the radial tilt adjustment screw and the tangential tilt adjustment screw again so that the eye pattern can be seen the most clearly. As necessary, adjust the two screws alternately so that the eye pattern can be seen the most clearly.

Note:Radial and tangential mean the directions relative to the disc shown in Figure 4.

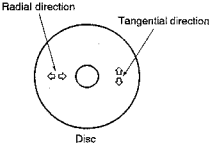
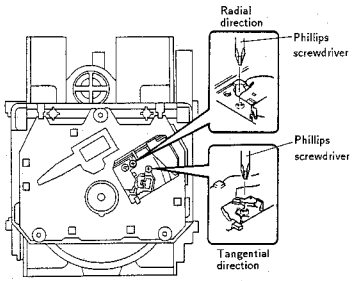


Figure 4



Adjustment locations

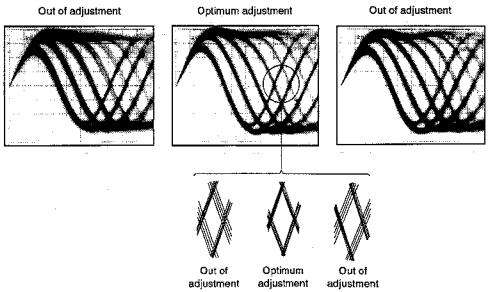


Figure 5 Eye pattern

5. RF Level Adjustment

● Objective	To optimize the playback RF signal amplitude		
● Symptom when out of adjustment	No play or no search		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 50 mV/division 10 ms/division AC mode	● Player state ● Adjustment location ● Disc	Test mode, play VR1(laser power) YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R=35 mm) with the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key, then press the PROGRAM key, then the PLAY ▷ key in that order to close the respective servos and put the player into play mode.
2. Adjust VR1 (laser power) so that the RF signal amplitude is 1.2 Vp-p ± 0.1 V.

6. Focus Servo Loop Gain Adjustment

● Objective	To optimize the focus servo loop gain.		
● Symptom when out of adjustment	Playback does not start or focus actuator noisy.		
● Measurement instrument connections	See figure 6. [Settings] CH1 CH2 20 mV/division 5 mV/division X-Y mode	● Player state ● Adjustment location ● Disc	Test mode, play VR152 (FCS. GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 1 Vp-p.
2. Press the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key to move the pickup to halfway across the disc (R=35 mm), then press the PROGRAM key, the PLAY ▷ key, then the PAUSE ▯▯ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR152 (FCS. GAN) so that the Lissajous waveform is symmetrical about the X axis and the Y axis.

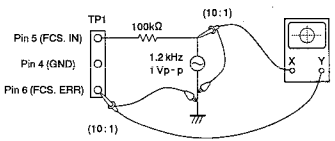
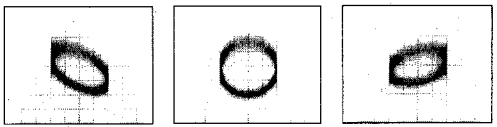


Figure 6

Focus Gain Adjustment



Higher gain | Optimum gain | Lower gain

7. Tracking Servo Loop Gain Adjustment

● Objective	To optimize the tracking servo loop gain.		
● Symptom when out of adjustment	Playback does not start, during searches the actuator is noisy, or tracks are skipped.		
● Measurement instrument connections	See Figure 7. [Settings] CH1 CH2 50 mV/division 50 mV/division X-Y mode	● Player state ● Adjustment location ● Disc	Test mode, play VR151 (TRK. GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 2 Vp-p.
2. Press the MANUAL SEARCH FWD ▷▷ or REV ◁◁ key to move the pickup to halfway across the disc (R=35 mm), then press the PROGRAM key, the PLAY ▷ key, then the PAUSE ▯▯ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR151 (TRK. GAN) so that the Lissajous waveform is symmetrical about the X axis and the Y axis.

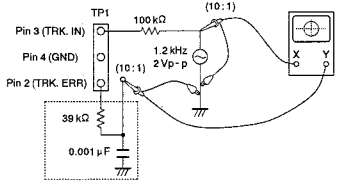
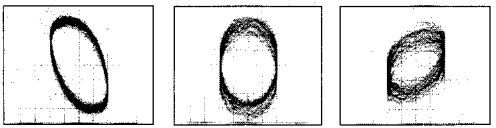


Figure 7

Tracking Gain Adjustment



Higher gain | Optimum gain | Lower gain

8. Focus Error Signal (Focus S Curve) Verification

● Objective ● Symptom when out of adjustment	To judge whether the pickup is ok or not by observing the focus error signal. The pickup is judged from the amplitude of the tracking error signal (as discussed in the section on adjusting the tracking error balance) and the waveform for the focus error signal.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 6 (FCS. ERR). [Settings] 100 mV/division 5 ms/division DC mode	● Player state ● Adjustment location ● Disc	Test mode, stop None YEDS-7

[Procedure]

1. Connect TP1 Pin 5 to ground.
2. Mount the disc.
3. While watching the oscilloscope screen, press the PROGRAM key and observe the waveform in Figure 8 for a moment. Verify that the amplitude is at least 2.5 Vp-p and that the positive and negative amplitude are about equal. Since the waveform is only output for a moment when the PROGRAM key is pressed, press this key over and over until you have checked the waveform.

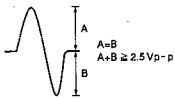


Figure 8

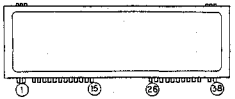
[Judging the pickup]

Do not judge the pickup until all the adjustments have been made correctly. In the following cases, there may be something wrong with the pickup.

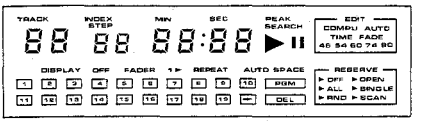
1. The tracking error signal amplitude is extremely small (less than 2 Vp-p).
2. The focus error signal amplitude is extremely small (less than 2.5 Vp-p).
3. The positive and negative amplitudes of the focus error signal are extremely asymmetrical (2 : 1 ratio or more).
4. The RF signal is too small (less than 0.8 Vp-p) and even if VR1 (laser power) is adjusted , the RF signal can not be brought up to the standard level.

7. FL INFORMATION

EXTERNAL VIEWS

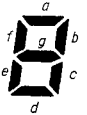


DISPLAY PATTERN ANODE GRID ASSIGNMENT



ANODE GRID ASSIGNMENT AND PIN ASSIGNMENT

	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10
a	a	a	a	a	a	a	a		▷	a
b	b	b	b	b	b	b	b	SCAN	▮▮	b
c	c	c	c	c	c	c	c	►OPEN	54	c
d	d	d	d	d	d	d	d	reserve	46	d
e	e	e	e	e	e	e	e	►(single)	60	e
f	f	f	f	f	f	f	f	►(scan)	90	f
g	g	g	g	g	g	g	g	SINGLE	74	g
h		DISPLAY	OFF	FADER	1►	REPEAT	AUTO SPACE	► OFF	TIME FADE	
i	1	2	4	5	7	8	10	►(ALL)	AUTO	
j	TRACK	3	STEP	6		9	PGM	ALL	EDIT	:
k		12	INDEX	15	MIN	18	►	►(RND)	PEAK SEARCH	SEC
l	11	13	14	16	17	19	DEL	RND	COMPU	



PIN ASSIGNMENT

Pin No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Assignment	F	F	NP	e	f	g	h	a	b	c	d	i	j
Pin No.	14	15	16	17	18	19	20	21	22	23	24	25	26
Assignment	k	l	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	G1
Pin No.	27	28	29	30	31	32	33	34	35	36	37	38	
Assignment	G2	G3	G4	G5	G6	G7	G8	G9	G10	NP	F	F	

F : Filament G1-G10 : Grid a-l : Anode NP : No pin

8. FOR PD-8700/HEM, HB, SD AND PD-8700-S/HEWM TYPES

NOTES :

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

CONTRAST OF MISCELLANEOUS PARTS

The PD-8700/HEM, HB, SD and PD-8700-S/HEWM types are the same as the PD-31/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.					Remarks
		PD-31/KU	PD-8700 /HEM	PD-8700 /HB	PD-8700 /SD	PD-8700-S /HEWM	
⚠◉	Mother board assembly	PWM1448	PWM1449	PWM1449	PWM1449	PWM1449	*1
⚠	S trans board assembly	Non supply	Non supply	Non supply	Non supply	Non supply	*2
⚠	A trans board assembly	Non supply	Non supply	Non supply	Non supply	Non supply	*2
⚠	AC power cord	PDG1015	PDG1003	PDG1036	PDG1013	PDG1003	
⚠	Power transformer S(AC120V)	PTT1179	.....	.....	.....	.....	
⚠	Power transformer S(AC220,240V)	.....	PTT1178	PTT1178	.....	PTT1178	
⚠	Power transformer S (AC110, 120-127, 220, 240V)	.....	.....	.....	PTT1181	.....	
⚠	Power transformer A(AC120V)	PTT1183	.....	.....	.....	.....	
⚠	Power transformer A(AC220,240V)	.....	PTT1182	PTT1182	.....	PTT1182	
⚠	Power transformer A (AC110, 120-127, 220, 240V)	.....	.....	.....	PTT1185	.....	
⚠	Voltage selector	.....	.....	.....	PSB1002	.....	
⚠	Strain relief	CM-22C	CM-22B	CM-22B	CM-22B	CM-22B	
	Cord with plug (mini plug)	PDE-319	.....	.....	.....	.....	
	Front panel assembly	PEA1164	PEA1132	PEA1132	PEA1132	PEA1152	
	Control panel	PNW1948	PNW1948	PNW1948	PNW1948	PNW2009	
	Power button	PAC1569	PAC1569	PAC1569	PAC1569	PAC1590	
	Select button	PAC1570	PAC1570	PAC1570	PAC1570	PAC1591	
	Play button	PAC1571	PAC1571	PAC1571	PAC1571	PAC1592	
	Search button	PAC1572	PAC1572	PAC1572	PAC1572	PAC1593	
	Headphone knob S	.....	.....	.....	.....	PAC1597	
	Knob C	RAC1608	RAC1608	RAC1608	RAC1608	.....	
	Slide knob	RAC1428	RAC1428	RAC1428	RAC1428	PAC1599	
	Tray panel	PNW2025	PNW1949	PNW1949	PNW1949	PNW2011	
	Display window	PAM1503	PAM1488	PAM1488	PAM1503	PAM1488	
	Bonnet	PYY1148	PYY1148	PYY1148	PYY1148	PYY1154	
	CD packing case	PHG1679	PHG1678	PHG1678	PHG1678	PHG1680	For packing

*1 : As to the parts list of the Mother board assembly, refer to page 12.

*2 : These assemblies are the same as the PD-31/KU type for the service supply parts.

Mark	Symbol & Description	Part No.					Remarks
		PD-31/KU	PD-8700 /HEM	PD-8700 /HB	PD-8700 /SD	PD-8700-S /HEWM	
	Operating instructions(English)	PRB1151	.....	PRB1139	PRB1139	.....	
	Operating instructions (English/French)	.....	PRE1142	.....	.....	.....	
	Operating instructions (German/Italian/Dutch/Swedish /Spanish/Portuguese)	.....	PRF1042	.....	.....	PRF1042	
	Operating instructions (Spanish)	.....	.....	.....	PRC1035	.....	

9. FOR PD-7700/KU, KC, HEM, HB, SD, HPW AND PD-7700-S/HEWM TYPES

9.1 CONTRAST OF MISCELLANEOUS PARTS

NOTES :

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

The PD-7700/KU, KC, HEM, HB, SD, HPW and PD-7700-S/HEWM types are the same as the PD-31/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.								Remarks
		PD-31/KU	PD-7700 /KU	PD-7700 /KC	PD-7700 /HEM	PD-7700 /HB	PD-7700 /SD	PD-7700 /HPW	PD-7700-S /HEWM	
⚠◉	Mother board assembly	PWM1448	PWM1444	PWM1444	PWM1445	PWM1445	PWM1447	PWM1444	PWM1445	
⚠◉	Audio board assembly	PWZ2118	.....	.....	.....	.....	.....	.....	.....	
⚠	S trans board assembly	Non supply	.....	.....	.....	.....	.....	.....	.....	
⚠	A trans board assembly	Non supply	.....	.....	.....	.....	.....	.....	.....	
⚠◉	Operate board assembly	PWZ2112	PWZ2111	PWZ2111	PWZ2111	PWZ2111	PWZ2111	PWZ2111	PWZ2111	
⚠	SW board assembly	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	
⚠	Headphone board assembly	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	
⚠	Jack board assembly	Non supply	.....	.....	.....	.....	.....	.....	.....	
⚠	Voltage selector	.....	.....	.....	.....	.....	PSB1002	.....	.....	
⚠	Power transformer S(AC120V)	PTT1179	PTT1179	PTT1179	.....	.....	.....	.....	.....	
⚠	Power transformer S(AC220,240V)	.....	.....	.....	PTT1178	PTT1178	.....	PTT1178	PTT1178	
⚠	Power transformer S(AC110, 120-127, 220, 240V)	.....	.....	.....	.....	.....	PTT1181	.....	.....	
⚠	Power transformer A(AC120V)	PTT1183	.....	.....	.....	.....	.....	.....	.....	
⚠	AC power cord	PDG1015	PDG1015	PDG1015	PDG1003	PDG1036	PDG1013	PDG1006	PDG1003	
⚠	Strain relief	CM-22C	CM-22C	CM-22C	CM-22B	CM-22B	CM-22B	CM-22B	CM-22B	
	Front panel assembly	PEA1164	PEA1133	PEA1133	PEA1133	PEA1133	PEA1133	PEA1133	PEA1153	
	Control panel	PNW1948	PNW1948	PNW1948	PNW1948	PNW1948	PNW1948	PNW1948	PNW2009	
	Power button	PAC1569	PAC1569	PAC1569	PAC1569	PAC1569	PAC1569	PAC1569	PAC1590	
	Select button	PAC1570	PAC1570	PAC1570	PAC1570	PAC1570	PAC1570	PAC1570	PAC1591	
	Play button	PAC1571	PAC1571	PAC1571	PAC1571	PAC1571	PAC1571	PAC1571	PAC1592	
	Search button	PAC1572	.....	.....	.....	.....	.....	.....	.....	
	Headphone knob	.....	PAC1600	PAC1600	PAC1600	PAC1600	PAC1600	PAC1600	PAC1601	
	Slide knob	RAC1428	.....	.....	.....	.....	.....	.....	.....	
	Knob C	RAC1608	.....	.....	.....	.....	.....	.....	.....	
	Display window	PAM1503	PAM1503	PAM1503	PAM1488	PAM1488	PAM1503	PAM1503	PAM1488	
	Cord with plug (mini plug)	PDE-319	.....	.....	.....	.....	.....	.....	.....	
	Tray panel	PNW2025	PNW1949	PNW1949	PNW1949	PNW1949	PNW1949	PNW1949	PNW2011	
	Bonnet	PYY1148	PYY1148	PYY1148	PYY1148	PYY1148	PYY1148	PYY1148	PYY1154	
	CD packing case	PHG1679	PHG1683	PHG1683	PHG1681	PHG1681	PHG1681	PHG1681	PHG1682	For Packing
	Stopper	PNM1134	PNM1070	PNM1070	PNM1070	PNM1070	PNM1070	PNM1070	PNM1070	
	Insulator	PNW2020	VNK1095	VNK1095	VNK1095	VNK1095	VNK1095	VNK1095	VNK1095	
	Cord clamper	RNH-184	.....	.....	.....	.....	.....	.....	.....	
	BIAS lens	RNK1674	.....	.....	.....	.....	.....	.....	.....	
	Operating instructions(English)	PRB1151	PRB1139	.....	.....	PRB1139	PRB1139	PRB1139	.....	
	Operating instructions(English/French)	.....	.....	PRE1142	PRE1142	.....	.....	.....	.....	
	Operating instructions (German/Italian/Dutch/Swedish/Spanish/Portuguese)	.....	.....	.....	PRF1042	.....	.....	.....	PRF1042	
	Operating instructions(Spanish)	.....	.....	.....	.....	.....	PRC1035	.....	.....	

9.2 P.C.B.'s PARTS LIST

NOTES :

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex.1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560Ω	*56 × 10¹ 561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³ 473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*	*RD2H 0 R 5 K*
1Ω	*010*	*RD1P 0 1 0 K*

Ex.2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ	*562 × 10¹ 5621*	*RD1/4SR 5 6 2 1 F*

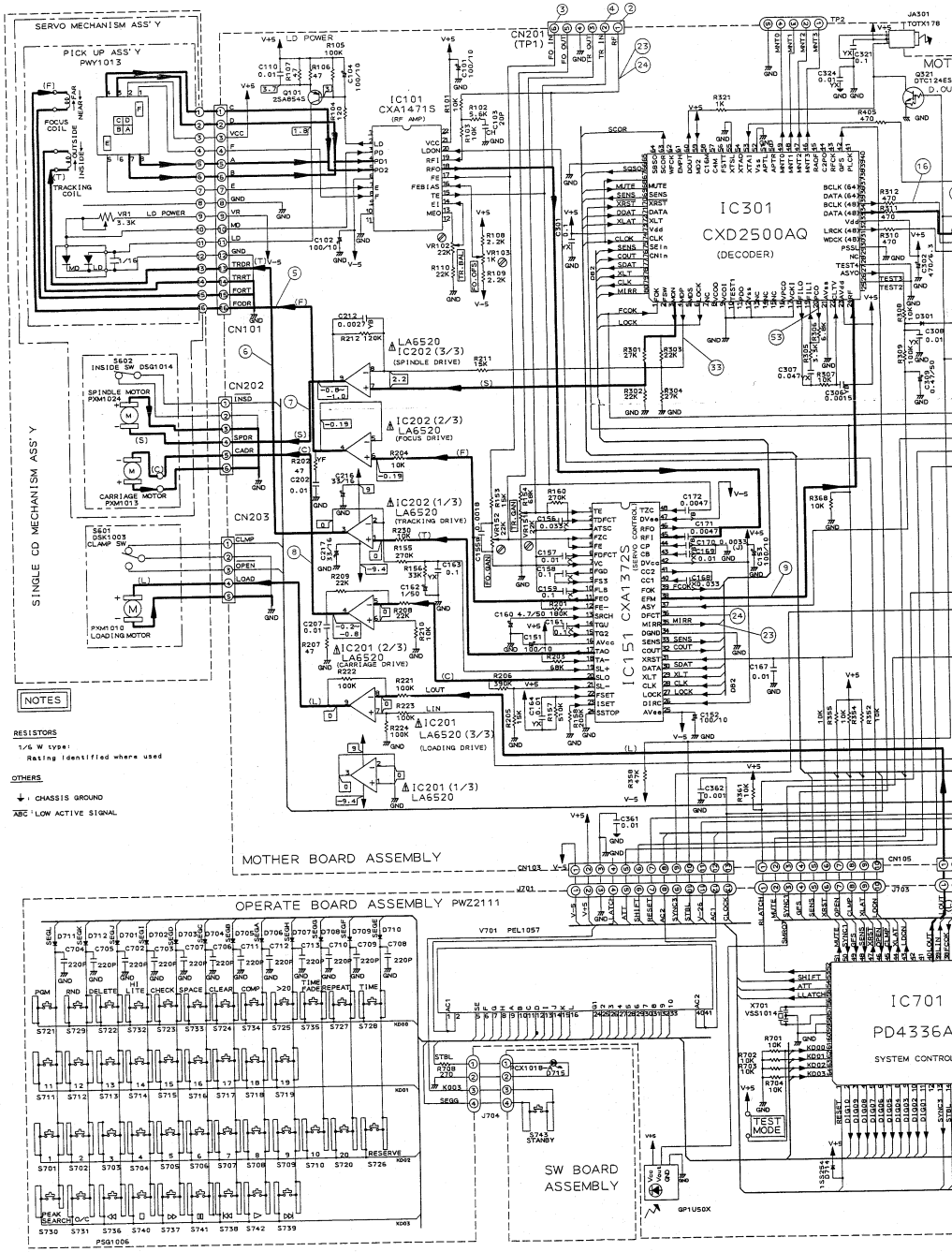
Mark	No.	Description	Parts No.
		◉MOTHER BOARD ASSEMBLY	
		(PWM1444: PD-7700/KU, KC and HPW types)	
		(PWM1445: PD-7700/HEM, HB and PD-7700-S/HEWM types)	
		(PWM1447: PD-7700/SD type)	
		SEMICONDUCTORS	
⚠	IC20	REGULATOR IC	M5298P
	IC21	REGULATOR IC	NJM78L06A
	IC22	REGULATOR IC	NJM79L06A
	IC23	REGULATOR IC	NJM7805FA
⚠	IC31	IC(PWM1445,PWM1447 only)	ICP-N10
	IC101	PRE AMP IC	CXA1471S
	IC151	SERVO IC	CXA1372S
⚠	IC201,IC202	POWER OP-AMP,IC	LA6520
	IC301	EFM DEMODULATION IC	CXD2500AQ
	IC401	D/A CONVERTER,IC	PD2026A
	IC402	OP-AMP IC (PWM1444, PWM1447 only)	M5238PF
	IC402	OP-AMP IC (PWM1445 only)	NJM5532DD
	Q101	TRANSISTOR	2SA854S
	Q321,Q351	TRANSISTOR	DTC124ES
	Q391	TRANSISTOR	2SC1740S
	Q401-Q404	TRANSISTOR	2SD2144S
	Q405	TRANSISTOR	DTC124ES
	Q406	TRANSISTOR	DTA124ES
	Q451,Q452	TRANSISTOR	DTA124ES
	Q453,Q454	TRANSISTOR	2SB1296
⚠	D11-D14,D52	DIODE	11ES2
	D54	ZENNER DIODE	MTZJ18B
	D301	DIODE	1SS254
	D391-D394	DIODE(PWM1444 only)	1SS254
	D395-D397	DIODE	1SS254
	D451,D452	DIODE	1SS254

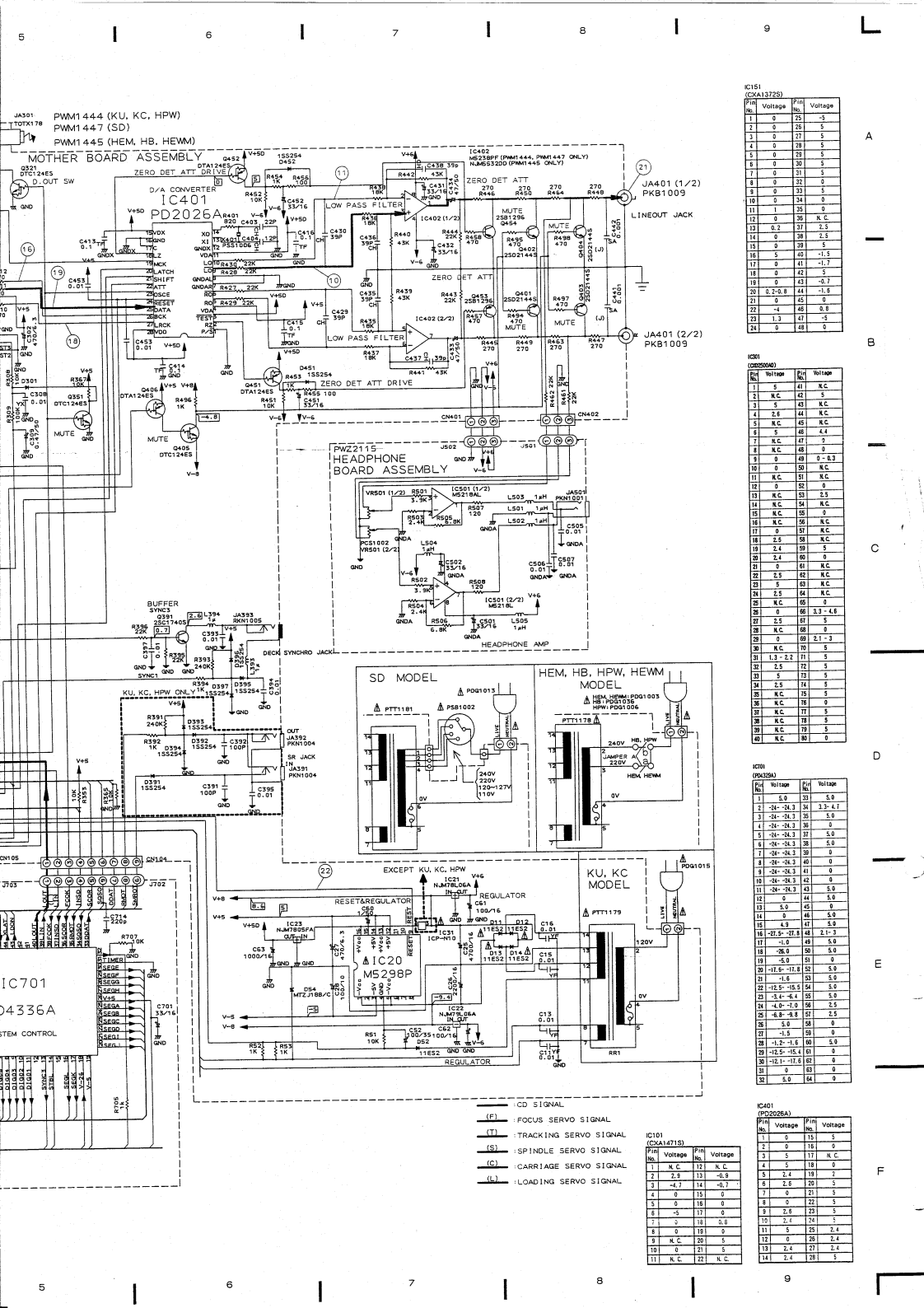
Mark	No.	Description	Parts No.
		COILS	
	L393	AXIAL INDUCTOR	LAU010K
	L394	AXIAL INDUCTOR	LAU010K
		CAPACITORS	
	C11,C13	CERAMIC CAPACITOR	CKCYF103Z50
	C15,C16	CERAMIC CAPACITOR	CKCYF103Z50
	C25	ELECTROLYTIC CAPACIT	CEAS472M16
	C26	ELECTR.CAPACITOR	CEAS222M16
	C27	ELECTROLYTIC CAPACIT	CEAS471M6R3
	C28	ELECTR.CAPACITOR	CEAS101M10
	C52	ELECTR.CAPACITOR	CEAS101M35
	C60	ELECTR.CAPACITOR	CEAS010M50
	C61,C62	ELECTR.CAPACITOR	CEAS101M16
	C63	ELECTR.CAPACITOR	CEAS102M16
	C101,C102	ELECTR.CAPACITOR	CEAS101M10
	C103	CERAMIC CAPACITOR	CCCCH200J50
	C104	ELECTR.CAPACITOR	CEAS101M10
	C110	CERAMIC CAPACITOR	CKCYF103Z50
	C151-C153	ELECTR.CAPACITOR	CEAS101M10
	C155	CERAMIC CAPACITOR	CKCYB182K50
	C156	CERAMIC CAPACITOR	CGCYX333K25
	C157	CERAMIC CAPACITOR	CGCYX103K25
	C158,C159	CERAMIC CAPACITOR	CGCYX104K25
	C160	ELECTR.CAPACITOR	CEAS4R7M50
	C161	CERAMIC CAPACITOR	CGCYX104K25
	C162	ELECTR.CAPACITOR	CEAS010M50
	C163	CERAMIC CAPACITOR	CGCYX104K25
	C164	CERAMIC CAPACITOR	CGCYX103K25
	C167	CERAMIC CAPACITOR	CKCYF103Z50
	C168	CERAMIC CAPACITOR	CGCYX333K25
	C169	CERAMIC CAPACITOR	CGCYX103K25
	C170	CERAMIC CAPACITOR	CKCYB332K50
	C171,C172	CERAMIC CAPACITOR	CKCYB472K50
	C202,C207	CERAMIC CAPACITOR	CKCYF103Z50

Mark	No.	Description	Parts No.
	C212	CERAMIC CAPACITOR	CKCYB272K50
	C216,C217	ELECTR.CAPACITOR	CEAS330M16
	C301	CERAMIC CAPACITOR	CGCYX104K25
	C302	ELECTROLYTIC CAPACIT	CEAS471M6R3
	C306	CERAMIC CAPACITOR	CKCYB152K50
	C307	CERAMIC CAPACITOR	CGCYX473K25
	C308	CERAMIC CAPACITOR	CGCYX103K25
	C309	ELECTR.CAPACITOR	CEASR47M50
	C321	CERAMIC CAPACITOR	CGCYX104K25
	C324	CERAMIC CAPACITOR	CKCYF103Z50
	C361	CERAMIC CAPACITOR	CKCYF103Z50
	C362	CERAMIC CAPACITOR	CKCYB102K50
	C391,C392	CERAMIC CAPACITOR (PWM1444 only)	CCCSL101J50
	C393,C394	CERAMIC CAPACITOR	CKCYF103Z50
	C395	CERAMIC CAPACITOR (PWM1444 only)	CKCYF103Z50
	C397	CERAMIC CAPACITOR	CKCYF103Z50
	C403	CERAMIC CAPACITOR	CCCCH220J50
	C404	CERAMIC CAPACITOR	CCCCH120J50
	C413-C416	AUDIO FILM CAPACITOR	CFTXA104J50
	C429,C430	CERAMIC CAPACITOR	CCCCH390J50
	C431,C432	ELECTR.CAPACITOR	CEAS330M16
	C433,C434	ELECTR.CAPACITOR	CEAS470M50
	C435-C438	CERAMIC CAPACITOR	CCCCH390J50
	C441,C442	PL.STYRENE CAPACITOR	CQSA102J50
	C451,C452	ELECTR.CAPACITOR	CEAS330M16
	C453	CERAMIC CAPACITOR	CKCYF103Z50
RESISTORS			
	VR102	VR	VRTB6VS223
	VR103	VR	VRTB6VS102
	VR151	VR	VRTB6VS223
	VR152	VR	VRTB6VS223
	R391	CARBON FILM RESISTOR (PWM1444 only)	RD1/6PM244J
	R392	CARBON FILM RESISTOR (PWM1444 only)	RD1/6PM102J
	Other resistors		RD1/6PM□□□J
OTHERS			
	CN101	CONNECTOR	52045-1610
	JA301	OPTICAL OUTPUT JACK	TOTX178
	JA391	JACK/12V(PWM1444 only)	PKN1004
	JA392	JACK/12V(PWM1444 only)	PKN1004
	JA393	JACK (mini)	PKN1005
	JA401	JACK (2P)	PKB1009
	X401	XTAL RES (OSC)	PSS1006

Mark	No.	Description	Parts No.
◉OPERATE BOARD ASSEMBLY (PWZ2111)			
SEMICONDUCTORS			
	IC701	MICROCOMPUTER,IC	PD4336A
	D701-D714	DIODE	1SS254
SWITCHES			
	S701-S742	SWITCH	PSG1006
		1-20, PGM, DELETE, CHECK, CLEAR, >20, RESERVE, REPEAT, TIME, RND, PEAK SEARCH, O/L, HI LITE SCAN, AUTO SPACE, COMPU, TIME FADE, ⏮, ⏭, ⏪, ⏩, STOP(□), PLAY(▷)	
CAPACITORS			
	C701	ELECTR.CAPACITOR	CEAS330M16
	C702-C714	AXIAL CAPACITOR	CKPUYB221K50
RESISTORS			
	All resistors		RD1/6PM□□□J
OTHERS			
	V701	FL INDICATOR TUBE	PEL1057
	X701	CERAMIC RESONATOR	VSS1034
	PHOTO SENSOR UNIT		GP1U50X
SW BOARD ASSEMBLY			
SEMICONDUCTORS			
	D715	LED	PCX1018
SWITCHES			
	S743	SWITCH (ON/STN BY)	PSG1006
HEADPHONE BOARD ASSEMBLY			
SEMICONDUCTORS			
	IC501	OP-AMP,IC	M5218AL
COILS			
	L501-L505	AXIAL INDUCTOR	LAU010K
CAPACITORS			
	C501,C502	ELECTR.CAPACITOR	CEAS330M16
	C505-C507	CERAMIC CAPACITOR	CKCYF103Z50
RESISTORS			
	VR501	VARIABLE RESISTOR	PCS1002
	Other resistors		RD1/6PM□□□J
OTHERS			
	JA501	JACK	RKN1001

9.4 SCHEMATIC DIAGRAM





IC151 (CXA1372S)

Pin No.	Voltage	Pin No.	Voltage
1	0	25	-5
2	0	26	5
3	0	27	5
4	0	28	5
5	0	29	5
6	0	30	5
7	0	31	5
8	0	32	0
9	0	33	5
10	0	34	0
11	1	35	0
12	0	36	N.C.
13	0.2	37	2.5
14	0	38	2.5
15	0	39	5
16	5	40	-1.5
17	0	41	-1.7
18	0	42	5
19	0	43	-0.7
20	0.2-0.8	44	-1.5
21	0	45	0
22	-4	46	0.8
23	1.3	47	-5
24	0	48	0

IC301 (CXD2500AQ)

Pin No.	Voltage	Pin No.	Voltage
1	5	41	N.C.
2	N.C.	42	5
3	5	43	N.C.
4	2.6	44	N.C.
5	N.C.	45	N.C.
6	5	46	4.4
7	N.C.	47	0
8	N.C.	48	0
9	0	49	0 - 0.3
10	0	50	N.C.
11	N.C.	51	N.C.
12	0	52	0
13	N.C.	53	2.5
14	N.C.	54	N.C.
15	N.C.	55	0
16	N.C.	56	N.C.
17	0	57	N.C.
18	2.5	58	N.C.
19	2.4	59	5
20	2.4	60	0
21	0	61	N.C.
22	2.5	62	N.C.
23	5	63	N.C.
24	2.5	64	N.C.
25	N.C.	65	0
26	0	66	3.3 - 4.6
27	2.5	67	5
28	N.C.	68	0
29	0	69	2.1 - 3
30	N.C.	70	5
31	1.3 - 2.2	71	5
32	2.5	72	5
33	5	73	5
34	2.5	74	5
35	N.C.	75	5
36	N.C.	76	0
37	N.C.	77	5
38	N.C.	78	5
39	N.C.	79	5
40	N.C.	80	0

IC701 (PD4336A)

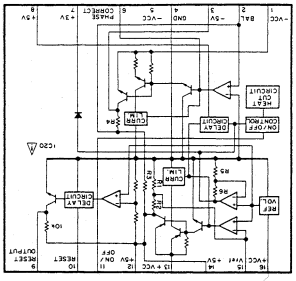
Pin No.	Voltage	Pin No.	Voltage
1	5.0	33	5.0
2	-24- -24.3	34	3.3- 4.7
3	-24- -24.3	35	5.0
4	-24- -24.3	36	0
5	-24- -24.3	37	5.0
6	-24- -24.3	38	5.0
7	-24- -24.3	39	0
8	-24- -24.3	40	0
9	-24- -24.3	41	0
10	-24- -24.3	42	0
11	-24- -24.3	43	5.0
12	-24- -24.3	44	5.0
13	5.0	45	0
14	0	46	5.0
15	4.9	47	5.0
16	-21.5- -21.8	48	2.1- 3
17	-1.0	49	5.0
18	-26.0	50	5.0
19	-5.0	51	0
20	-11.6- -11.8	52	5.0
21	-1.6	53	5.0
22	-12.5- -13.5	54	5.0
23	-3.4- -6.4	55	5.0
24	-4.0- -7.0	56	2.5
25	-6.8- -9.8	57	2.5
26	5.0	58	0
27	-1.5	59	0
28	-1.2- -1.6	60	5.0
29	-12.5- -15.4	61	0
30	-12.1- -17.6	62	0
31	0	63	0
32	5.0	64	0

IC401 (PD2026A)

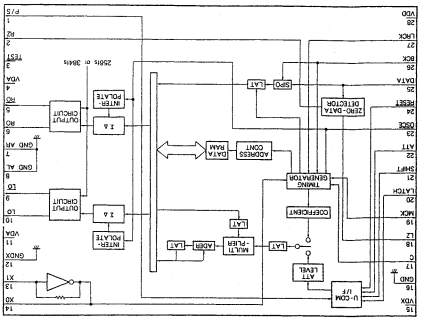
Pin No.	Voltage	Pin No.	Voltage
1	0	15	5
2	0	16	0
3	5	17	N.C.
4	5	18	0
5	2.4	19	2
6	2.6	20	5
7	0	21	5
8	0	22	5
9	2.6	23	5
10	2.4	24	5
11	5	25	2.4
12	0	26	2.4
13	2.4	27	2.4
14	2.4	28	5

IC101 (CXA1471S)

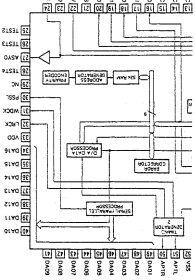
Pin No.	Voltage	Pin No.	Voltage
1	N.C.	12	N.C.
2	2.5	13	-0.9
3	-4.7	14	-0.7
4	0	15	0
5	0	16	0
6	-5	17	0
7	5	18	0.6
8	0	19	0
9	N.C.	20	5
10	0	21	5
11	N.C.	22	N.C.



IC20
MC5298P



IC401
PD2026A

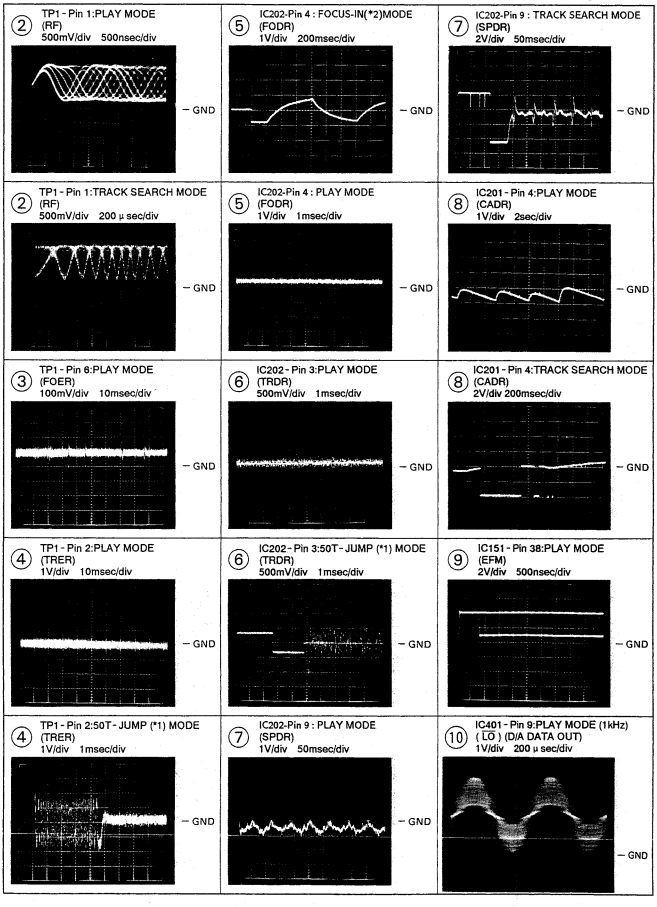


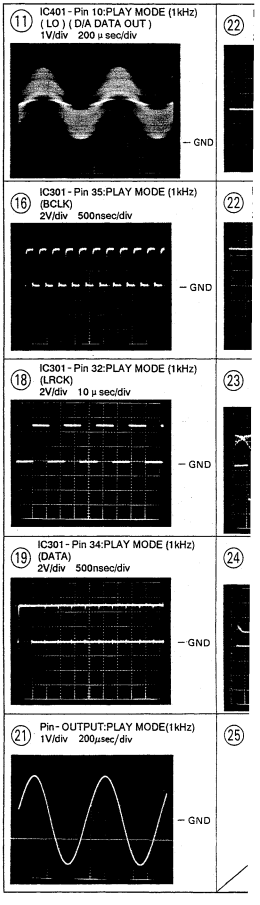
9.3 WAVEFORMS

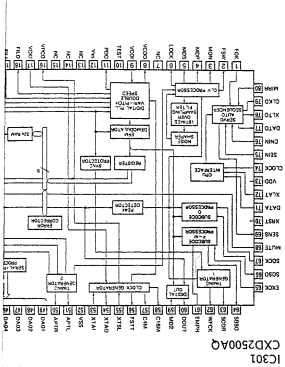
Note:The encircled numbers denote measuring in the schematic diagram.

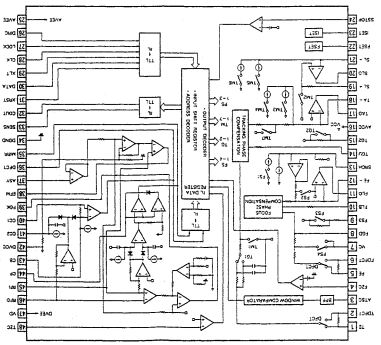
*1 50T-JUMP:After switching to the pause mode, press the manual search key.

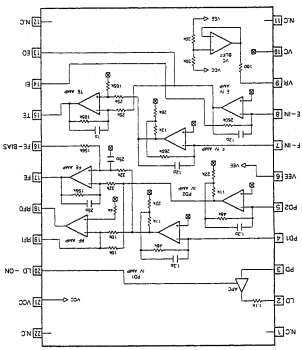
*2 FOCUS-IN:Press the key without loading a disc.



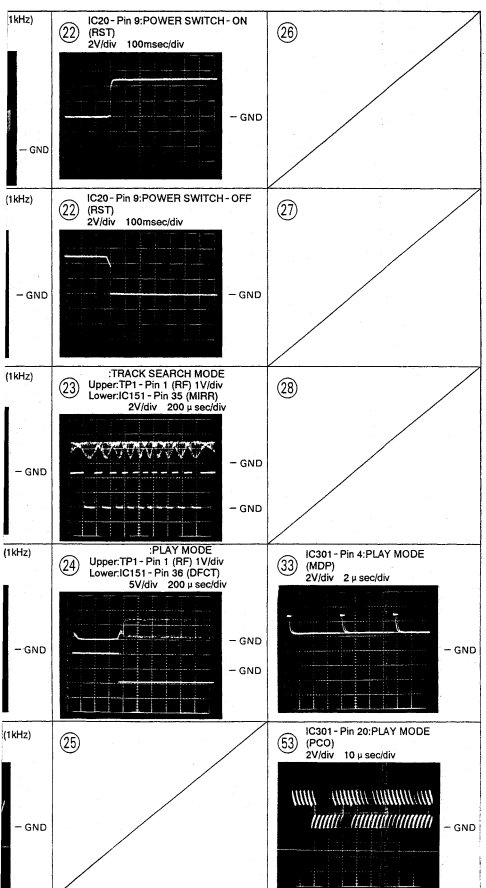



IC301
CXD2500AQ


IC151
CXA1372S


IC101
CXA1471S

● IC BLOCK DIAGRAM



1.RESISTORS :
Indicated in Ω, 1/4W, 1/6W and 1/8W, ±5% tolerance unless otherwise noted
k ; kΩ M : MΩ (F) ; ±1%, (G) ; ±2%, (K) ; ±10%, (M) ; ±20% tolerance.

2.CAPACITORS :
Indicated in capacity (μF)/voltage(V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.

3.VOLTAGE, CURRENT :
[ ] ; DC voltage (V) at play state.
<mA ; DC current at play state.
Value in ( ) is DC current at stop state.

4.OTHERS :
➡ ; Signal route.
⊘ ; Adjusting point
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES : (The underlined indicates the switch position)
SWITCH BOARD ASSEMBLY
S743 : POWER ON-OFF

OPERATE BOARD ASSEMBLY

S701 : 1
S702 : 2
S703 : 3
S704 : 4
S705 : 5
S706 : 6
S707 : 7
S708 : 8
S709 : 9
S710 : 10
S711 : 11
S712 : 12
S713 : 13
S714 : 14
S715 : 15
S716 : 16
S717 : 17
S718 : 18
S719 : 19
S720 : 20
S721 : PGM
S722 : DELETE

S723 : CHECK
S724 : CLEAR
S725 : > 20
S726 : RESERVE
S727 : REPEAT
S728 : TIME
S729 : RND
S730 : PEAK SEARCH
S731 : O/L
S732 : HI LITE SCAN
S733 : AUTO SPACE
S734 : COMPU] EDIT
S735 : TIME FADE]
S736 : ⏮] MANUAL SEARCH
S737 : ⏭]
S738 : ⏮⏮] TRACK SEARCH
S739 : ⏭⏭]
S740 : STOP(□)
S741 : PAUSE(▯▯)
S742 : PLAY(▷)
(S743 : ON/STN BY)

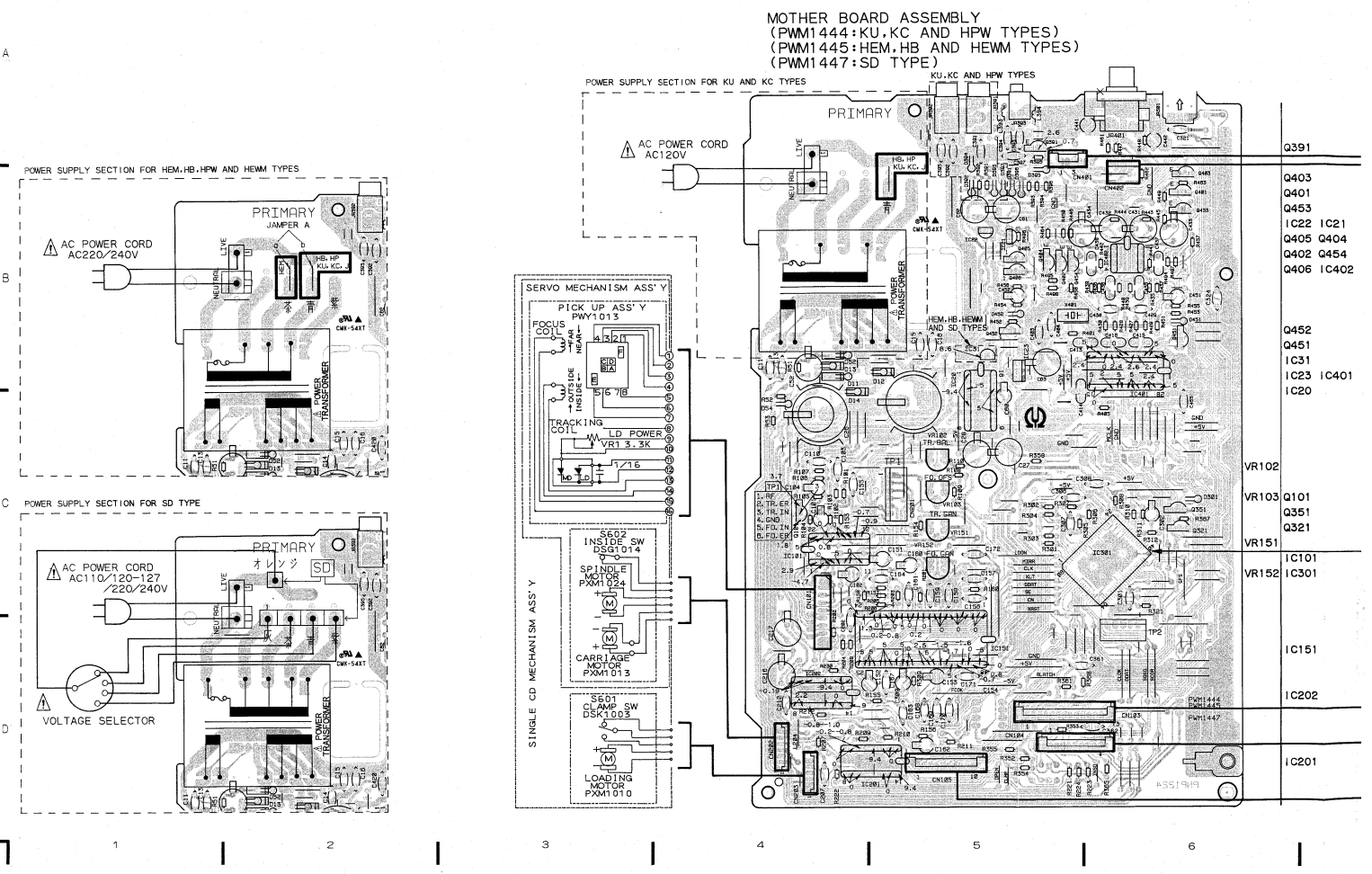
Line Voltage Selection (For HB,HEM, HPW and HEWM types)
Line voltage can be changed with the following steps.
1. Disconnect the AC power cord.
2. Remove the top cover.
3.Change the position of the jumper wire A as follows

Voltage	Jumper wire A position
220V	a
240V	b

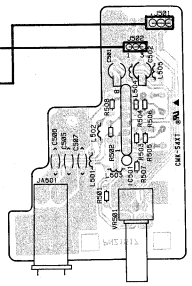
4. Stick the line voltage label on the rear panel.

Parts No.	Description
AXX-193	220V label
AXX-192	240V label

9.5 P.C.BOARDS CONNECTION DIAGRAM

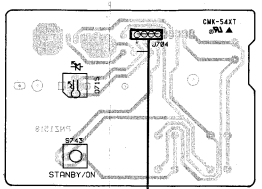


HEADPHONE BOARD ASSEMBLY



IC501

SW BOARD ASSEMBLY



IC701 (PQ12SA)

Pin No.	Voltage	Pin No.	Voltage
1	5.0	33	5.0
2	-24 - -24.3	34	3.3 - 4.7
3	-24 - -24.3	35	5.0
4	-24 - -24.3	36	0
5	-24 - -24.3	37	5.0
6	-24 - -24.3	38	5.0
7	-24 - -24.3	39	0
8	-24 - -24.3	40	0
9	-24 - -24.3	41	0
10	-24 - -24.3	42	0
11	-24 - -24.3	43	5.0
12	0	44	5.0
13	5.0	45	0
14	0	46	5.0
15	4.9	47	5.0
16	-21.5 - -21.8	48	2.1 - 3
17	-1.0	49	5.0
18	-30.0	50	5.0
19	-5.0	51	0
20	-11.6 - -11.8	52	5.0
21	-1.6	53	5.0
22	-12.5 - -15.5	54	5.0
23	-3.4 - -6.4	55	5.0
24	-4.0 - -11.0	56	2.5
25	-6.8 - -6.8	57	2.5
26	5.0	58	0
27	-1.5	59	0
28	-1.2 - -1.6	60	5.0
29	-12.5 - -15.4	61	0
30	-12.1 - -11.6	62	0
31	0	63	0
32	5.0	64	0

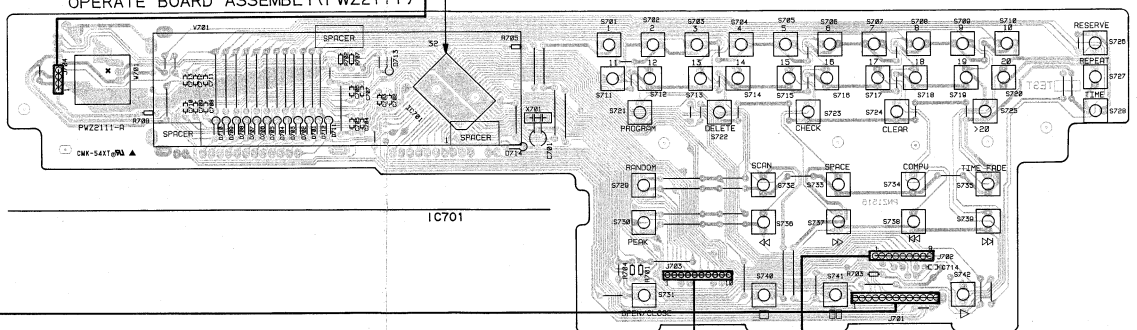
IC301 (CDD5000AD)

Pin No.	Voltage	Pin No.	Voltage
1	5	41	N.C.
2	N.C.	42	5
3	5	43	N.C.
4	2.6	44	N.C.
5	N.C.	45	N.C.
6	5	46	4.4
7	N.C.	47	0
8	N.C.	48	0
9	0	49	0 - 0.3
10	0	50	N.C.
11	N.C.	51	N.C.
12	0	52	0
13	N.C.	53	2.5
14	N.C.	54	N.C.
15	N.C.	55	0
16	N.C.	56	N.C.
17	0	57	N.C.
18	2.5	58	N.C.
19	2.4	59	5
20	2.4	60	0
21	0	61	N.C.
22	2.5	62	N.C.
23	5	63	N.C.
24	2.5	64	N.C.
25	N.C.	65	0
26	0	66	3.3 - 4.6
27	2.5	67	5
28	N.C.	68	0
29	0	69	2.1 - 3
30	N.C.	70	5
31	1.3 - 2.2	71	5
32	2.5	72	5
33	5	73	5
34	2.5	74	5
35	N.C.	75	5
36	N.C.	76	0
37	N.C.	77	5
38	N.C.	78	5
39	N.C.	79	5
40	N.C.	80	0

P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
		FET			Mylar capacitor
		Diode			Styrol capacitor
		Zenner diode			Electrolytic capacitor (Non polarized)
		LED			Electrolytic capacitor (Noiseless)
		Varactor			Electrolytic capacitor (Polarized)
		Tact switch			Electrolytic capacitor (Polarized)
		Inductor			Power capacitor
		Coil			Semi-fixed resistor
		Transformer			Resistor array
		Filter			Resistor
					Resonator
					Thermistor

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

OPERATE BOARD ASSEMBLY(PWZ2111)



Q391
Q403
Q401
Q453
IC22 IC21
Q405 Q404
Q402 Q454
Q406 IC402
Q452
Q451
IC31
IC23 IC401
IC20
VR102
VR103 Q101
Q351
Q321
VR151
IC101
VR152 IC301
IC151
IC202
IC201

9.5 P.C.BOARDS CONNECTION DIAGRAM

MOTHER BOARD ASSEMBLY
(PWM1444:KU,KC AND HPW TYPES)
(PWM1445:HEM,HB AND HEWM TYPES)
(PWM1447:SD TYPE)

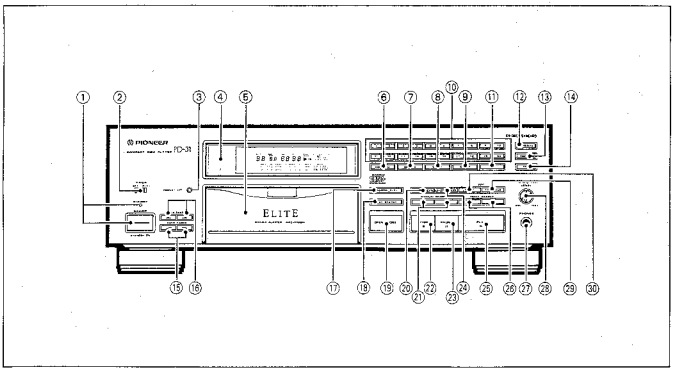
This P.C.B. connection diagram is viewed from the foil side.

SW BOARD ASSEMBLY

HEADPHONE BOARD ASSEMBLY

OPERATE BOARD ASSEMBLY(PWZ2111)

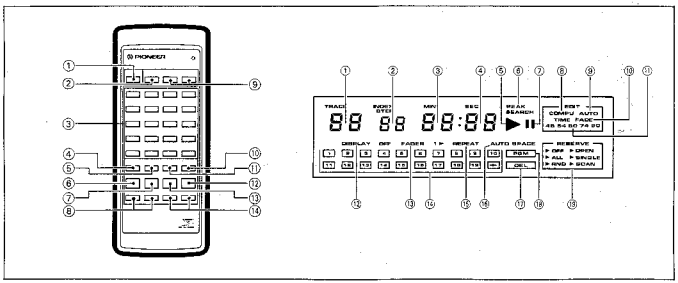
10. PANEL FACILITIES



FRONT PANEL

① **POWER STANDBY/ON switch and indicator**
Press this switch to turn the power on. The unit will set to the standby mode and the STANDBY indicator will light.

② **TIMER OFF/PLAY switch**
③ **DISPLAY OFF button**
④ **Remote sensor**
⑤ **Disc tray**
⑥ **PROGRAM button**
⑦ **DELETE button**
⑧ **CHECK button**
⑨ **CLEAR button**
⑩ **Track number buttons (1–20)**
⑪ **>20 button**
⑫ **RESEVRE button**
⑬ **REPEAT button**
⑭ **TIME button**
⑮ **AUTO FADER buttons (,)**
⑯ **INDEX SEARCH buttons (,)**
⑰ **RANDOM PLAY button**
⑱ **PEAK SEARCH button**
⑲ **OPEN/CLOSE button**
⑳ **HI-LITE SCAN button**
㉑ **MANUAL SEARCH buttons (◀◀, ▶▶)**
㉒ **STOP button (■)**
㉓ **PAUSE button (▮▮)**
㉔ **AUTO SPACE button**
㉕ **PLAY button (▶)**
㉖ **TRACK SEARCH buttons (⏮, ⏭)**
㉗ **Headphones jack (PHONES)**
㉘ **Headphones/line volume control (PHONES/LINE LEVEL)**
㉙ **TIME FADE EDIT button**
㉚ **Program edit button (EDIT) (■ COMPU/ ■■ AUTO)**



REMOTE CONTROL UNIT

Buttons listed here but not accompanied with explanations have the same functions as the corresponding front panel buttons.

① POWER button
② OPEN/CLOSE button
③ Track number buttons (1–20)
④ HI-LITE SCAN button
⑤ RESERVE button
⑥ RANDOM PLAY button
⑦ STOP button (■)
⑧ Manual search buttons (MANUAL ◀◀, ▶▶)
⑨ OUTPUT LEVEL buttons (–, +)
⑩ >20 button
⑪ PROGRAM button
⑫ PLAY button (▶)
⑬ PAUSE button (▮▮)
⑭ Track search buttons (TRACK ⏮, ⏭)

DISPLAY

① Displays track numbers (01–99) during playback or track search.
② Displays index numbers (sub-divisions of tracks); during program input, indicates program steps.
③ Displays track playing time and remaining time (minutes).
④ Displays track playing time and remaining time (seconds).
⑤ Lights during playback.
⑥ Lights when peak volume levels on the disc are detected.
⑦ Lights during playback pause.
⑧ Lights during use of computer allocated program editing or auto program editing.
⑨ Lights during auto program editing.
⑩ Lights during time fade editing.
⑪ Indicates the editing time.
⑫ Lights when display is in OFF mode.
⑬ Lights during operation of fade function.
⑭ Calendar display. Lighted numbers indicate total number of tracks on the disc (during program input and program playback, indicates programmed tracks). When a track completes playback, the corresponding lighted number goes out. Arrow mark [➡] lights for tracks higher than "19".
⑮ Lights during repeat playback. (During single-track repeat, the [1▶] indicator also lights).
⑯ Lights during auto space.
⑰ Lights during delete mode.
⑱ Lights during program mode.
⑲ When "reserve" function is activated, these indicators light in correspondence to the reserved functions (OFF, OPEN, ALL, SINGLE, RND, SCAN).

11. SPECIFICATIONS

1. General

Type ..... Compact disc digital audio system
Usable discs ..... Compact Disc
Power requirements ..... AC 120V, 60Hz
Power consumption 18W
Operating temperature ..... +5°C – +35°C
(+41°F – +95°F)
Weight 5.0kg (11lb)
External dimensions ..... 420(W) × 274(D) × 135(H)mm
16-9 /16(W) × 10-13/16(D) × 5-5/16(H) in.

2. Audio section

Frequency response ..... 2Hz – 20kHz ±0.5dB
S/N ..... 108dB or more (EIAJ)
Dynamic range ..... 97dB or more (EIAJ)
Channel separation ..... 102dB or more (EIAJ)
Total harmonic distortion ..... 0.0022% or less (EIAJ)
Wow and flutter ..... Limit of measurement
(±0.001% W.PEAK) or less (EIAJ)
Number of channels ..... 2 channels (stereo)

3. Output terminal

- Audio line output terminals (FIXED)
- Audio line output terminals (VARIABLE)
- CD-DECK SYNCHRO terminal
- Headphone jack (with motor drive volume control)
- Optical digital output terminal
- Control input/output terminals

4. Functions

- Play
- Pause
- Stop
- Auto space
- Manual search
- Track search
- Index search
- Peak search
- Hi-lite scan
- Direct selection
- Single track repeat
- All track repeat
- Programmed repeat
- Delete repeat
- Random play repeat
- Programmed random play repeat
- Delete play repeat random
- Programmed playback (up to 24 tracks)
- Delete playback
- Pause program
- Program check
- Program correction
- Program clear
- Auto program edit
- Compu program edit
- Time fade edit
- Digital level control
- Random play
- Programmed random play
- Delete random play
- Fade in/fade out
- Time location
- Reserve
- Display off
- Program hold
- Level hold
- Timer start
- CD-deck synchro

5. Accessories

- Remote control unit 1
- Size AAA/R03 dry cell batteries 2
- Output cable 1
- Control cord 1
- Operating instructions 1

NOTE:
The specifications and design of this product are subject to change without notice, due to improvements.